

**BUILDING BRANDS:
SUPPLY CHAIN ALLIANCES
IN THE CANADIAN BEEF INDUSTRY**

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TABLE OF CONTENTS

LIST OF FIGURES	v
ACKNOWLEDGEMENTS	vi
EXECUTIVE SUMMARY.....	vii
1 INTRODUCTION TO THE STUDY	1
2 FACTORS DRIVING THE DEVELOPMENT OF BRANDED BEEF PROGRAMS	2
2.1 Concentration and Consolidation.....	2
2.2 Changes in Coordination.....	3
2.3 Barriers to Increased Supply Chain Coordination.....	4
2.4 Degree of Coordination: Evidence.....	5
2.5 Beef Consumption	6
2.6 Consumers and Branded Beef Programs	7
2.7 Classifying Branded Beef Programs	7
2.8 Branded Beef Case Studies	10
2.8.1 Certified Angus Beef.....	10
2.8.2 Decatur Beef Alliance	12
2.8.3 Ranchers Renaissance	14
2.8.4 Future Beef Operations	15
3 A FRAMEWORK FOR ANALYSING SUPPLY CHAIN COORDINATION	17
3.1 Understanding Transaction Costs	17
3.2 Search, Experience and Credence Attributes.....	18
3.3 Branded Programs and Asset Specific Investments	20
3.4 Branded Beef Programs and Uncertainty	22
3.4.1 Information Asymmetry.....	22
3.4.2 Incomplete Information	24
3.4.3 Price Uncertainty – Quality Variability.....	25
3.4.4 Price Uncertainty – Number of Buyers	25
3.4.5 Number of Sellers.....	27
3.5 Additional Factors: Critical Stages	27

3.6 Additional Factors: Source and Process Verification.....	28
3.7 Overview of Transaction Characteristics	28
3.8 Transaction Characteristics and Supply Chain Structures	31
4. COW-CALF PRODUCERS: WILLINGNESS TO PARTICIPATE	
IN ALLIANCES.....	33
4.1 Methodological Design.....	33
<i>4.1.1 Asset Specific Investments</i>	<i>34</i>
<i>4.1.2 Price Uncertainty – Quality Variability.....</i>	<i>34</i>
<i>4.1.3 Price Uncertainty – Number of Buyers</i>	<i>35</i>
<i>4.1.4 Premiums Received</i>	<i>35</i>
<i>4.1.5 Other Potential Characteristics</i>	<i>35</i>
4.2 Data Collection	36
4.3 Survey Results	37
<i>4.3.1 Relative Importance of Program Characteristics</i>	<i>37</i>
<i>4.3.2 Trade-offs between Transaction Characteristics</i>	<i>40</i>
4.4 Additional Insights.....	43
<i>4.4.1 Perceptions of Alliances.....</i>	<i>43</i>
<i>4.4.2 Perceived Market Size</i>	<i>43</i>
<i>4.4.3 Membership Fees</i>	<i>44</i>
4.5 Implications	45
5. EXISTING ALLIANCES: LESSONS LEARNED.....	46
5.1 Introduction.....	46
5.2 Overview of the Alliances.....	48
<i>5.2.1 Program Structures.....</i>	<i>48</i>
<i>5.2.2 Coordination of Production.....</i>	<i>55</i>
<i>Pricing Method</i>	<i>55</i>
<i>Program Requirements</i>	<i>55</i>
<i>Traceability and Certification Systems</i>	<i>56</i>
<i>5.2.3 Benefits of Improved Coordination.....</i>	<i>56</i>
5.3 Transaction Characteristics	57
<i>5.3.1 Specialized Investments</i>	<i>57</i>

<i>Brand Ownership</i>	59
<i>Alignment with Packer-owned Programs</i>	61
5.3.2 Price Uncertainty Associated with Quality Variability	62
<i>Encouraging Producer Participation in Grid-based Pricing Systems</i>	62
<i>Does Grid Pricing make Alliances Redundant?</i>	63
5.3.3 Information Asymmetry	63
5.3.4 Number of Buyers and Sellers	64
5.4 Critical Success Factors and Challenges for Alliances	65
5.4.1 Creating Value Along the Supply Chain	65
5.4.2 Marketing the Entire Carcass	66
5.4.3 Managing Product Flow	67
5.4.4 Concentration in the Processing and Retailer Sectors	68
5.5 Additional Strategies to Improve Coordination	69
5.5.1 Retained Ownership of Cattle by Cow-calf Producers	69
5.5.2 Certification Institutions	70
5.5.3 Electronic Identification and Computer Vision Scanning Systems	71
5.5.4 Information Management Systems	72
6 CONCLUSIONS	73
6.1 Cow-calf Producer Survey: Key Findings	73
6.2 Alliance Interviews: Key Findings	74
6.3 Implications for the Industry	75
6.3.1 Critical Success Factors	75
6.3.2 Critical Challenges	75
6.3.3 Opportunities	76
6.4 Further Research	77
7. TECHNICAL APPENDIX: CONJOINT ANALYSIS	79
7.1 Specifying the Form of the Basic Model	79
7.2 Designing Program Scenarios	79
7.3 Sample Statistics	80
7.4 Conjoint Results – Reliability and Validity	81
REFERENCES	82

LIST OF TABLES

Table 1 – Supply Chain Structures for Branded Beef Programs	10
Table 2 – Asset Specific Investments and Branded Beef Attributes	22
Table 3 – Information Asymmetry and Branded Beef Attributes.....	23
Table 4 – Predicted Market Size in Terms of Number of Buyers.....	26
Table 5 – Branded Beef Attributes and Critical Stages	28
Table 6 – Overview of Transaction Characteristics.....	30
Table 7 – Relationship between Transaction Characteristics and Supply Chain Outcomes	32
Table 8 – Characteristics and Characteristic Levels Used in Survey	36
Table 9 – Example of a Program Scenario	36
Table 10 – Aggregate Part-Worth Values for Each Characteristic Level.....	38
Table 11 – Increased Transaction Costs Outweigh a Price Premium	40
Table 12 – Trade-off between Farm Improvement Expenditures and 5-10% Price Premiums	41
Table 13 – Trade-off between Farm Improvement Expenditures and 0-5% Price Premiums	41
Table 14 – Organizations Interviewed.....	47
Table 15 – Key Features of the Alliances Interviewed.....	49
Table 16 – Summary of Program Requirements and Benefits from Participation in Alliances	52
Table A1 - Comparison of Sample and Canadian Census of Agriculture Data.....	80

LIST OF FIGURES

Figure1 – Relative Importance of Program Characteristics (n=73).....	39
Figure 2 – Estimated and Perceived Market Size for Branded Beef Attributes	44
Figure 3 – Willingness to Participate in Programs Based on Membership Fees	45

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BUILDING BRANDS: SUPPLY CHAIN ALLIANCES IN THE CANADIAN BEEF INDUSTRY

EXECUTIVE SUMMARY

Consumers are increasingly demanding differentiated food products, focusing on health, convenience, novelty, and information about how their food was produced. Branded beef programs are emerging as a response to this market trend, but to date only on a relatively limited scale in Canada. Nevertheless, closer coordination through supply chain alliances is developing alongside the traditional commodity production system as means to present consumers with differentiated, value-added beef products.

This study examines the factors that create a successful supply chain alliance for the provision of branded beef products. Distinctions are drawn between different branded beef programs in terms of the product attribute that the program emphasizes, for example, production methods (grass-fed, hormone-free, organic) versus eating quality (tenderness, leanness), versus breed, etc. In many cases, cow-calf producers play a critical role in producing these attributes, yet their involvement in supply chain alliances has been hesitant.

The transaction costs of forming and sustaining supply chain alliances for branded beef programs are evaluated. Potential barriers to the development of successful alliances are identified through a survey of cow-calf producers in western Canada. In-depth interviews with stakeholders from existing supply chain alliances in the U.S. and Canada are used to investigate how these potential barriers can be overcome.

While cow-calf producers are willing to make trade-offs and accept increased costs to participate in an alliance, it is not surprising that they are only willing to do so when the perceived benefits are greater than the costs. Investment in farm improvement expenditures, if required for participation in a supply chain alliance, is likely to be a deterrent to participation. The adoption of feed or health protocols, or the requirements to follow record-keeping procedures, are relatively more acceptable to producers if sufficient price premiums are available. The balance between premiums received and the costs of required investments appears to be relatively more important to cow-calf producer participation than the number of buyers and the pricing method.

The relationship between pricing method and the receipt of quality information deserves emphasis. Cow-calf producers, on average, indicated a preference for a combination of live weight and carcass quality pricing, even though using this pricing method means that they incur some of the risk associated with variability in cattle quality. They appear willing to accept the increased risk of price discounts in exchange for quality information and the opportunity to earn quality-based price premiums. A pricing system based solely on carcass quality, although it generates accurate price signals, remains unpopular with many cow-calf producers. Nevertheless, the industry interviews revealed that alliances have readily adopted the use of grid-based pricing systems to improve information flows and provide incentives for improving quality. These systems reduce information costs associated with searching out quality information. Less monitoring of production practices is required when price is directly tied to the quality of production through a more detailed grid.

Several general conclusions emerged from the interviews with key managers and directors of alliances in Canada and the United States. Asset specific investments have typically been limited to compliance with specific feed and health protocols and the

implementation of record/certification systems. This is consistent with the results of the producer survey, which indicated that, at some level, cow-calf producers were willing to undertake these types of investments to receive the benefits of alliance participation.

Ownership of a brand name label affects the type of supply chain coordination that emerges. Alliances that owned a brand name label, or had an exclusive relationship with a retailer-owned brand, tended to have a more formal structure to ensure that supply commitments were honoured, for example, using contracts and/or membership fees. Brand ownership means that these alliances have significantly more to lose in terms of damage to brand name capital from a failure to meet supply requirements.

The numbers of buyers and sellers did not have a substantial impact on the type of supply chain coordination used within alliances. This reflects the reciprocal nature of the relationship between buyers and sellers. Sellers with specialized products need to be guaranteed access into the markets that sell these products. Buyers also need a constant supply of specialized products that cannot be easily procured through the spot market in order to fulfill their downstream market obligations.

Short term market fluctuations create challenges for alliances and underscore the importance of the long term commitment of supply chain participants. Emphasizing benefits such as access to markets and the ability to obtain increased information helps ensure the long term commitment of cattle producers.

All of the alliances examined were linked to specific processors and in some cases they were linked directly to a retailer. While the success of alliances did not seem dependent on direct alignment with the retail sector, alignment with a processor(s) is essential. Packers are the interface between end-users and the production sectors and are central to the transfer of information between end-users and the rest of the supply chain.

The packer role, in some senses, is a double-edged sword. Although alignment with a packer is usually necessary to the success of an alliance, the high concentration of the processing and retailer sectors limits the number of alliances that can be expected to develop and be sustainable. Building relationships with large numbers of cow-calf producers to ensure adequate supplies is costly. Packers are likely to prefer to establish relationships with a limited number of reliable suppliers over the long run. There is an important first-mover advantage for those alliances that are first to establish a foothold in the Canadian market due to the concentrated structure of the processing and retailing sectors. Once processors and retailers have developed a few brand name labels and aligned themselves with a couple of alliances they are less likely to form additional alliances or develop additional brand name products. Although an advantage to those first in the door, this will also be a potential barrier to entry to latecomers.

The structure of cow-calf operations also presents a challenge to the development of alliances and improved coordination within the industry. Producers often run mixed farming operations and, as a result, the opportunity costs of reallocating human and capital resources from other enterprises into cow-calf production can be quite high. This may limit the willingness of some cow-calf producers to participate in alliances. Existing alliances have employed a number of strategies to encourage producer participation, including price incentives to match calving patterns with the supply needs of the market.

Although challenges remain to improving coordination in the beef industry, several opportunities exist to lower transaction costs and facilitate improved coordination. These include programs to encourage retained ownership by cow-calf producers, the development

of certification institutions and standardized quality assurance programs, and the use of information management systems, electronic identification, and computer vision scanning (CVS) technologies.

Several potential extensions to this research are apparent, including an examination of additional transaction characteristics and the extent to which cow-calf producers are willing to make trade-offs to participate in alliances. There are many questions about the retailer/processor interface that deserve closer attention. The retailing sector has a significant impact on how beef products are presented to consumers and the types of supply chain relationships that are expected to emerge. The interaction between retailers and other supply chain participants is poorly understood. The role of tracking and tracing technologies in delivering retail-level quality assurances and the scope for building on the existing Canadian cattle identification system to facilitate quality assurances is also an important question.

The development of differentiated beef products that match consumer preferences is critical to the future sustainability and growth of the beef industry in Canada. Closer supply chain coordination can assist in helping the industry understand consumer preferences and deliver credible quality assurances to consumers. This research has taken a first step toward understanding how transaction characteristics affect supply chain coordination in the Canadian beef industry, and identifying critical success factors and challenges to improved coordination in the future.

BUILDING BRANDS: SUPPLY CHAIN ALLIANCES IN THE CANADIAN BEEF INDUSTRY

1 INTRODUCTION TO THE STUDY

Over the past decade, substantial changes have taken place in the beef industry, with increased consolidation and closer coordination along the supply chain. These changes are partly a result of twenty years of declining consumption that plagued the beef industry during the 1980s and 1990s. During this period, consumers began to demand high-quality food products offering convenience and variety. Cholesterol levels, fat content, production practices, and health concerns have become important issues in food markets. The production of differentiated beef products and ‘branded beef’ is an effort to respond to these consumer demands. However, this has only occurred to a limited extent in the Canadian beef industry, largely due to rigidities in the existing supply chain. The industry is primarily set up to handle commodity production; a system which tends to have lower average costs of production from economies of scale. However, the production of differentiated products offering a range of product characteristics to consumers is less suited to large-scale commodity-based supply chains. The commingling that occurs with bulk handling means that producers do not receive strong price signals from consumers to reward the production of beef that more closely matches consumer preferences.

Slowly, increased supply coordination is emerging alongside commodity production systems and spot market transactions. This includes marketing and production contracts, brand licensing organizations, marketing alliances, and new generation producer cooperatives. These coordination mechanisms vary in terms of the premiums generated, the costs of coordination, and the allocation of net returns between different supply chain participants. The resulting branded products operate in niche markets where premium prices are expected to exist.

The primary objective of this study is to examine the factors that create a successful supply chain alliance. Alliances can take a variety of forms, with some more suited to coordinating specific branded beef programs. This study identifies important distinctions between different branded beef programs in terms of the product attribute, or branded feature, that the program emphasizes, for example, production methods (grass-fed, hormone-free, organic) versus eating quality, versus breed, etc. The critical roles played by various supply chain participants in delivering specific quality assurances through a branded program are discussed. The transaction costs of forming and sustaining supply chain alliances for branded beef programs are evaluated. Potential barriers to the development of successful supply chain alliances are identified through a survey of cow-calf producers in western Canada. In-depth interviews with stakeholders from existing supply chain alliances in the U.S. and Canada are used to investigate how these potential barriers have been overcome. Finally, the opportunities for the development of branded beef supply chain alliances in the future are examined.

The report is organized in six sections. As a background to the later discussion, the second section provides a brief overview of factors driving the development of closer coordination and branded beef programs in North America and presents summaries of existing branded beef case studies. The third section describes the analytical framework used to evaluate supply chain alliances, explaining how a focus on ‘transaction costs’ can be

useful in understanding how different types of vertical alliances evolve. Section four presents the results of a survey of cow-calf producers that investigates the relative importance of the key features of supply chain alliances in influencing a producer's decision whether or not to join an alliance. Section five provides insights from in-depth interviews with U.S. and Canadian industry players currently involved in beef alliances. Finally, section six discusses the implications and conclusions of the analysis.

2 FACTORS DRIVING THE DEVELOPMENT OF BRANDED BEEF PROGRAMS

2.1 Concentration and Consolidation

Structural changes in the beef industry have influenced the development of supply chain alliances in this sector. Seedstock producers, focusing on the production of high quality purebred cattle, and commercial cow-calf producers vary widely in size, ranging from many small "lifestyle" farms to large commercial operations. The lower level of concentration in the cow/calf sector compared to other sectors of the beef industry has been attributed to the fact that calf production requires more land, labour, and management per unit of output. This has resulted in it being less conducive to the economies of size that have led to higher levels of concentration in other sectors of the industry (Barkema and Drabenstott, 1990). Typically, average production costs stay relatively constant as the number of calves produced increases, consequently very little consolidation has occurred in this sector (Barkema et al., 2001). Nevertheless, some consolidation has occurred in response to reduced market access and price differentials, as large feedlots and processors prefer to deal with fewer and larger suppliers. In Canada, 40 percent of the herd is located on farms with over 123 head of cattle. In the U.S., the largest 3.5 percent of cow-calf producers account for approximately a third of the cattle and the largest 9 percent account for approximately half of the cattle in the U.S. (International Beef Industry Congress, 2003). Meanwhile, the remainder of the U.S. cow-calf sector is in herds of less than a hundred head. Thus, while some consolidation is apparent, the majority of commercial cow-calf animals continue to be located in smaller herds (International Beef Industry Congress, 2002).

In the feedlot sector, concentration and consolidation is much more evident. Over the past twenty years the average size of feedlots has increased, while the number of feedlots has fallen. This trend has occurred because feedlots have found economies of size in cattle feeding. Savings were gained by spreading the costs of fixed investments across a large number of animals (Barkema et al., 2001). Feedlots have also been able to exploit economies of scale generated by a constant flow of emerging technologies that reduce their variable costs (Brester, 2002). This includes improved feed programs that increase feed efficiency, new health management protocols, and continually evolving identification systems, which aid in improving current tracking and record keeping systems.

Increasing concentration has been a major trend in the packing and processing sector, largely as a result of changes in consumer demand and subsequent efforts to trim costs. New technological developments have increased plant mechanization, improved processing capabilities, increased product innovation, and improved overall plant efficiency. The implementation of this technology requires high levels of capital investment. This has limited the ability of smaller high-cost plants to compete with larger plants that can

distribute the sunk costs over a larger production base and consequently have a lower per-unit cost.

Retailers are the other crucial link in the beef supply chain. Supermarkets have consolidated to reduce costs, capture market share, and to benefit from more effective and efficient coordination in all operating areas. For many food retailers, especially in the U.S., much of the consolidation is being driven by the competitive threat of Wal-Mart and other large discount retailers that have latterly added retail food sales to their stores (Allan, 2002).

2.2 Changes in Coordination

Vertical coordination refers to the means by which products move through the supply chain from producer to consumer. This includes simple spot markets at one extreme, where products move between stages in a commodity market in response to price signals, to vertical integration at the other end of the spectrum, where one firm owns successive production stages. In between lie a myriad of alternative coordinating mechanisms, including contracts, alliances, cooperatives, and so on. Vertical coordination in the beef industry has been characterized by a movement away from the traditional spot market system towards these closer forms of coordination. This improves information flow along the supply chain and enhances the ability of the beef industry to identify and adjust to changing consumer demands.

Contracts are sometimes used between processors and feedlots, while their emergence has been less apparent between cow-calf producers and feedlots. In a recent study, packers indicated that they used contracts mainly to secure higher quality cattle and more consistent quality cattle. This enables packers to establish contracts or long term supply agreements with retailers and other end users (Lawrence et al. 2001). Contracts also allow more control over throughput, so that plants can maximize capacity utilization and lower their average operating costs. Feedlots enter contracts with packers to secure quality premiums, to access detailed carcass performance data if a grid-based pricing system¹ is used and to ensure a market outlet for their cattle, reducing the costs of searching for buyers at a later stage (Lawrence et al., 2001; Hayenga et al., 2000).

Strategic alliances are an exchange relationship in which firms share the risks and benefits from mutually identified objectives. They allow the partners to maintain their independence while increasing supply chain coordination to improve the flow of information and the production of beef products tailored to consumer demands. Alliances also allow for the participation of several phases of the beef supply chain, whereas contracts typically organize transactions between only two supply chain participants. The involvement of multiple supply chain participants further improves coordination, facilitating traceability.

Generally, alliances have taken two paths in design structure, equity-based and non-equity based. Equity-based alliances, also known as formal alliances, typically require participants to undertake a contractual obligation and make a financial investment. Non-equity alliances, also known as informal alliances, may or may not require the use of a contract and do not require an initial financial investment to participate (Kovanda and

¹ Grid pricing systems price cattle on the basis of carcass quality, which is determined by the measurement of several different elements that often include carcass grade, carcass weight, yield grade, and rib-eye size. This differs from a live-weight pricing system where pricing is based on a visual inspection of the live animal and on live animal weight.

Schroeder, 2003). While informal alliances rely heavily on trust, the equity investment required in more formal alliances creates an incentive for a long-term relationship. Informal alliances can be further divided into brand licensing organizations and marketing alliances, while formal alliances are often known as new generation cooperatives. For the vast majority of alliances, pricing via grids has become the most common method of determining cattle value, as grid pricing sends clearer signals. Informal alliances typically rely on the sole use of such grids, with the Decatur Beef Alliance (discussed below) being a good example. More formal alliances rely on the organization of a new generation cooperative that mixes price incentives with non-price controls to produce cattle with particular traits (Beshear and Lamb, 1998).

Alliances allow for more control of the supply chain, improved traceability and the ability to transfer more detailed information among participants. In turn, this improves the ability of participants to produce beef with the specific quality characteristics that are desired by consumers and respond quickly to any market changes (Kovanda and Schroeder, 2003). A significant difference between contracts, informal alliances and formal alliances is that the joint investment in a cooperative situation provides additional assurances that participants are committed to the quality of their product. Downstream users benefit from a guaranteed supply of more consistent cattle, which reduces inefficiencies associated with fluctuations in supply (Boland and Katz, 2000). Commitment becomes especially important when the goal of a program is to provide a product with many detailed specifications or attributes that cannot easily be identified or assured along the supply chain.

Vertical integration represents the most closely coordinated supply chain structure, with all stages of the supply chain owned and controlled by one firm. Vertical integration further improves traceability and the transfer of information along the supply chain to reduce quantity and quality risk, generates efficiencies in moving a product through the system, and potentially captures profits from all levels of the supply chain (Hayenga et al., 2000). The movement towards full integration of the beef industry, however, has been limited primarily because of the varying scale of operation that each stage requires to function efficiently. Typically, calf operations operate most efficiently on a relatively small scale, compared with other stages of the supply chain, as production is land intensive. Producing over a wide geographic region would result in high monitoring costs that may discourage vertical integration. Vertical integration is also capital intensive.

2.3 Barriers to Increased Supply Chain Coordination

Why has closer coordination in the beef industry been slow to emerge? The beef industry faces several challenges in moving away from the traditional marketing system towards improved coordination through the use of contracts and alliances. Biological changes such as genetic improvement are much slower in cattle (24 months) compared with pork (12 months) and poultry (5 months). Shorter biological processes allow cost-reducing genetic improvements to be accomplished at a faster pace and enable more rapid progress towards improved consistency. This reduces the costs associated with monitoring production to ensure consistency. Also, while the genetic bases of poultry and pork are becoming narrower, the beef genetic base is widening due to a wider geographic dispersion. A widening genetic base reduces consistency and makes it more difficult to recognize desirable genetic traits and breed for those specific traits (Ward, 2001).

The number of industry stages has also affected the degree of vertical coordination. Pork and poultry have two key production stages (farrowing/finishing and hatching/growing) while beef often has three stages (seedstock/cow-calf, background feeders, and finishing feeders). Each stage has different resources and management needs and thus it is more difficult to manage a vertically integrated beef production unit (Ward, 2001).

Based on the current limitations to vertical integration in the beef industry, it is expected that the industry will continue to rely on the use of alliances. Alliances will probably be refined to improve coordination mechanisms and substitute for vertical integration where it is not viable. The use of contracts is likely to be limited to coordinating transactions at the feedlot-packer interface. This is where the development within the beef industry will likely diverge from the current pork and poultry models in the U.S., which are dominated by the use of production contracts and vertical integration.

2.4 Degree of Coordination: Evidence

Currently, in the U.S. beef industry the use of cash markets, marketing agreements and informal alliances dominate transactions. In 2001, a survey of feedlots was conducted in the largest cattle feeding states (Iowa, Kansas, Nebraska, and Texas) to examine changes in marketing methods for fed cattle. The percentage of fed cattle sold under contracts and alliances has increased over time, from 23 percent in 1996 to 52 percent in 2001 and is expected to increase to 65 percent by 2005 (Schroeder et al., 2002). Participation in alliances (formal and informal) has increased, with 45 percent of respondents indicating that in 2001 they marketed at least some cattle under an alliance as compared to only 11 percent in 1996. A shift in the price system has occurred, with the industry shifting away from pricing cattle on a live weight basis towards grid-based pricing. Between 1996 and 2001 the use of grid-based pricing had increased by 16 percent to 45 percent and was expected to reach 62 percent by 2006 (Schroeder et al., 2002).

Similar data regarding changes in the marketing of fed cattle in Canada is not available, but data from the three largest packers in Alberta suggest that cash sales are still the predominant means of marketing slaughter cattle. In 2002, 60% of fed cattle were procured on a cash (live weight) basis, 22 percent were procured through some type of marketing agreement, and 18 percent were packer owned (Canfax Research Services, 2003). Data was not available for either the U.S. or Canada on the marketing methods used between cow-calf producers and feeders, but it is anticipated that cash sales remain the predominant means of marketing feeder cattle.

Despite limitations to coordination, it is apparent that a transformation is nevertheless slowly occurring in the beef industry. The beef industry is currently in a state of change; consumer demands have shifted and the market is adjusting to supply the products being demanded, but has not fully transformed from the existing system. BSE has further disrupted the system and may encourage the development of closed supply chain alliances focusing on developing long-term markets for beef products offering traceability bundled with quality assurances.

Ultimately it is likely that the beef industry will operate through several different coordination mechanisms. Consumers demand many different product attributes and different levels of coordination are required to guarantee these attributes. Some programs have more detailed production requirements, requiring greater coordination and increased

costs, but also facilitating increased assurance of tenderness and other quality attributes. These programs will charge a higher price and will target specific consumer segments willing to pay a price premium. The key question is why one method of coordination will be preferred over another to produce beef with particular attributes? To understand this we must first consider how beef consumption patterns have been changing.

2.5 Beef Consumption

Until recently, the beef industry had experienced twenty years of declining consumption. Purcell (2000) estimated that the consumption of beef in the U.S. had declined by 42 percent during the previous two decades. Declining consumption of beef has also been apparent in Canada. From a peak annual consumption of around fifty kilograms per person in 1975, Canadian consumers now purchase only slightly more than twenty kilograms per capita (Unterschultz, 2000). Per capita consumption of poultry, however, has risen from 18 kg in the early 1970s to just over 35 kg in 1999 and is projected to continue to increase in the future (Purcell, 2000).

What has caused these changes in consumption? Changes in the relative prices of beef and chicken can explain a portion of the change. Beef prices have typically always been higher than chicken prices, but the ratio of these prices increased, from 2.5 in 1976 to 2.9 in 1989, making beef more expensive relative to chicken (Brester et al., 1995; Barkema and Drabenstott., 1990). Investment in poultry research and product innovation increased substantially during this same period. This assisted in reducing production and processing costs, which subsequently lowered retail chicken prices. Lower relative poultry prices led consumers to substitute away from more expensive beef and to purchase more chicken (Brester et al., 1995).

Changes in the relative prices of beef and chicken can only explain a portion of the total change in consumption. The development by the poultry industry of a wide array of consumer oriented products, including convenient, high quality, nutritious, and value-added products, has also been a major factor (Marsh et al., 2000).

Other demographic factors also impacted the demand for beef negatively, including slower population growth, greater ethnic diversity, smaller households, an aging more health conscious population, and rising disposable incomes (Kinsey and Senauer, 1996). Slower growth in the Canadian population implies that total food sales are not likely to grow very much, if at all. Expanded export markets for Canadian beef had been an important development prior to the BSE case. Greater ethnic diversity means that consumers are demanding a wider variety of products than are currently being provided by the beef industry.

Even though consumers are spending less time preparing meals they are paying more attention to cholesterol levels, fat, food safety, and other health concerns that are perceived to be related to the use of hormones, antibiotics, and non-organic inputs. The beef industry has not responded quickly to consumer demands for these attributes. While consumers are increasingly concerned about purchasing low-fat and low-cholesterol meat products, the beef industry, unlike the poultry industry, was slow to adjust to meet consumers' demands for differentiated products that provide these attributes (Purcell, 1993).

Consumers have also become more demanding when it comes to the quality and consistency of the foods that they consume. In the 1990 U.S. National Beef Quality Audit, meat tenderness was ranked the second most important quality characteristic, while overall

uniformity and consistency was the most important (Hudson and Purcell, 2003). Several studies show that there is a failure to provide consistently tender products to consumers. In an Alberta survey, over 30 percent of steaks and 35 percent of roasts purchased in a six month period were ranked as unacceptable for tenderness by a trained lab panel (Brewin and Ulrich, 1999). In a wider Canadian based survey, 44 percent of the consumers surveyed reportedly felt that buying beef was a game of chance, with respect to whether the quality they received met their expectations (International Livestock Congress, 2002).

To build market share the beef industry needs to develop products that are responsive to consumers. This requires focusing on the five principal demand drivers, as identified from consumer research: (1) consistency, quality, and palatability, (2) health and nutrition, (3) food safety, (4) environmental and animal welfare, and (5) convenience (International Livestock Congress, 2000).

2.6 Consumers and Branded Beef Programs

Beef has traditionally been marketed as generic meat cuts. Consumers have typically not chosen beef based on differentiated quality characteristics, but this is slowly changing as the industry begins to focus on increased product differentiation and “branded beef”. Existing grading systems are not able to classify and identify all of the beef attributes included in branded programs. Clearly, it would be difficult to design a grading system to incorporate attributes such as production methods, which are difficult to detect in a carcass and vary in importance from consumer to consumer. However, it is widely recognized that the existing Canadian and U.S. grading systems do not identify adequate proxy variables for measurements of eating quality such as tenderness. Even within the same quality grade, tenderness can vary considerably and may result in a negative eating experience (Lusk et al., 1999).

Many of the attributes that consumers are interested in purchasing cannot be assessed at the point of purchase. Tenderness, taste, production methods and traceability are attributes that cannot be discerned by gazing into the meat display case. Consumers must rely on other sources for this information. A brand name is one method of signalling quality to consumers. Branded differentiated products can provide a consistent, credible quality signal over time. Thus, brand “quality” is defined as consistency, tenderness, flavour, food safety, or any other specific characteristic that is demanded by consumers and provided under a particular brand. The potential for niche markets to emerge is increasing. Product differentiation can be used to appeal to specific groups of consumers that are willing to pay a premium for beef that includes the characteristics that they demand. Consumers may be willing to pay a premium if branded products lower their transaction costs of searching for a product with specific quality attributes.

The willingness of consumers to pay a premium is critical to the ability of branded beef products to improve profitability in the beef industry. While branding a retail product can be advantageous, there are added costs to consider. These costs are typically associated with the additional production and segregation costs incurred to meet the identity preservation requirements of branded beef programs and the potential risks of entering into closed supply chain relationships with a limited number of alternative buyers.

2.7 Classifying Branded Beef Programs

In the past few years, beef consumption in the U.S. has begun to recover. Since 1998, after nearly 20 years of continuous decline, per capita consumption of beef in the U.S. has increased each year (Purcell, 2002). These increases in consumption have been attributed in part to the introduction of value-added branded products that better meet consumer demands (Kovanda and Schroeder, 2003). In 1998, producer and processor brands accounted for between 10 and 12 percent of the total market share of U.S. beef (Allan, 2002). Gordon, a senior meat consultant with Sparks Companies, projects that by the year 2005, over 50 percent of U.S. beef will be branded (Lamp, 1998). Similar statistics are not available for Canada, but the percentage of the total market share of beef marketed through branded beef programs in Canada is probably lower than in the U.S. given that the emergence of these programs has been slower in Canada. The slower emergence of these programs may help to explain part of the 15% difference that has recently emerged between per capita beef consumption in Canadian and the U.S.

There is no single format for developing a particular branded beef program. The method of vertical coordination varies significantly and often depends on which supply chain member initiates the program and which attributes are being guaranteed. Currently, four dominant supply chain structures can be identified: brand licensing programs, marketing alliances, new-generation cooperatives, and externally coordinated programs.

Brand licensing programs have usually emerged under the auspices of existing breed organizations. These programs typically require that cattle meet a certain genetic template, specific to a particular breed. They create value by centering the program on a branded product that uses breed as a proxy to convey a standard of quality. Licensing programs tend to be very loosely coordinated with the only requirements being that participants are certified to sell beef under the program name and that the breed of cattle entering the program can be verified (Anton, 2002). The largest existing licensing program is the Certified Angus Beef (CAB) program run by the American Angus Association. This program is discussed in section 2.8.

Branded programs have also been initiated by processors and retailers under *marketing alliances*. These programs are owned by operations that purchase finished cattle from cow-calf producers and/or feedlots via a marketing alliance using a grid pricing system with more detailed program specifications. Marketing alliances, and their associated grid pricing systems, typically have quality, yield, and process requirements, creating stronger incentives for cow-calf producers and feedlots to produce animals that yield the desired quality traits (Anton, 2002). The production of high quality animals that meet all program requirements is rewarded with premiums above a set base price, while the production of low quality animals results in price discounts.

Prior to the emergence of grid-based pricing systems, cattle were traditionally sold on a live animal basis, with pricing based on the average traits of an entire lot of cattle. This type of pricing continues to be popular despite well-documented sizeable differences in value among animals. Basing price on average quality results in the market failing to send the appropriate price signals to producers regarding the quality attributes demanded. Marketing alliances that use grid-based pricing systems could improve information flow through the supply chain, and reduce quality variation (Unterschultz, 2000).

New generation cooperatives are also emerging as a means of producing differentiated beef products. Cooperatives are typically producer-owned entities that take a systems approach to beef production. The primary goal of cooperatives is to enhance the

flow of information to members, reduce production costs, and increase profitability. They may attempt to create new efficiencies by implementing uniform practices along the supply chain by coordinating production, processing and marketing through alliances. Stronger incentives for cow-calf producers to focus on improving quality are made possible (Beshear and Lamb, 1998; Kovanda and Schroeder, 2003).

The structure of new generation cooperatives is more formal than the other vertical coordination arrangements discussed above. Membership is often fixed and members are usually required to invest equity into the venture through the purchase of shares that come with certain rights and obligations. Shares establish a two-way contract between members and the cooperative, which requires members to sell a certain number of cattle through the cooperative and requires that the cooperative take delivery of these cattle. Often a grid-pricing system is used, which provides further incentives for members to comply with the quality or production specifications. Further, in addition to the premiums and discounts provided on the grid, closed cooperatives may pay dividends or bonuses to members that market cattle through their program (Anton, 2002; Boland and Katz, 2000)

Finally, *externally coordinated branded beef programs* have emerged. A new fully vertically-coordinated supply chain is created, with the initiative being driven by a newly formed corporation instead of an existing supply chain participant. The majority of these operations have only existed conceptually, with limited success when programs are actually put into operation. Nevertheless, the underlying structure remains a possible method of producing beef for large-scale branded beef programs in the future. Future Beef Operations was the first such initiative in the U.S. that attempted to coordinate cow-calf producers, feedlots, packing/processing, and retailers through the formation of a new entity (Roybal, 2001). Although this initiative failed, it provides some insights into how future programs may be coordinated, and is discussed in more detail in section 2.8.

The four types of supply chain coordination outlined above constitute a broad classification. Within this classification, significant variations can occur in terms of organizational and management structure. Many different value chain alliance structures have emerged within the industry and each is unique in certain aspects. However, identifying common features in a broad classification is a useful step in examining the reasons behind different methods of vertical coordination. Table 1 summarizes the four dominant supply chain structures and provides some examples. The following section presents a more detailed discussion of the examples.

Table 1- Supply Chain Structures for Branded Beef Programs

Type of Program	Key Features	Example(s)
Brand licensing program	Usually breed-based (licensed by breed organization); loosely coordinated; minimal production requirements	Certified Angus Beef; Certified Hereford Beef
Marketing Alliance	Owned by participant in supply chain; grid-pricing; more detailed program specifications	Decatur Beef Alliance
New-generation cooperative	Producer-owned; improved information flow to cow-calf producers; more formal management structure; member equity investment	Ranchers Renaissance; U.S. Premium Beef; Rancher's Choice
Externally coordinated program	Fully coordinated supply chain; external investors	Future Beef Operations

2.8 Branded Beef Case Studies

This section presents four brief case studies of existing branded beef programs that fall into each of the categories outlined above: Certified Angus Beef, Decatur Beef Alliance, Ranchers Renaissance, and Future Beef Operations. These examples illustrate how branded beef programs have developed to respond to changing consumer demands. They were selected as they all had a similar objective of providing an overall high quality, tender beef product and demonstrate the differences between the four classifications used in Table 1.

2.8.1 *Certified Angus Beef*²

The Certified Angus Beef (CAB) brand was started in 1978 and is the industry's oldest, largest, and most successful brand. CAB operates as a non-profit division of the American Angus Association, which is comprised of more than 28,000 Angus breeders. The goal of the program is to produce high quality, tender, flavourful beef. Currently, over 480 million pounds of beef are marketed through the CAB program annually. The program has grown by about 30 percent each year and sells products in the U.S. and fifty other countries in more than 8,000 restaurants and retail locations. Nonetheless, the CAB program has less than a one percent share of the U.S. beef market.

Standard USDA and CFIA beef grades are used for CAB beef. Individual herds are not "certified" and no living Angus cattle are actually "Certified Angus Beef". Rather, after meeting the live specification of being at least 51 percent black-hided, the program has eight further carcass specifications. On average, only 17.3 percent of evaluated Angus cattle

² Information for this section was derived from the following sources: Certified Angus Beef Website (2003); Brester (2002); Kovanda and Schroeder, 2003).

qualify to be sold under the Certified Angus Beef brand. The program aims to provide price incentives to improve cattle quality. Since inception, some cow-calf producers who specialize in producing Angus cattle have concentrated on producing animals that are suitable for the CAB program and have achieved an acceptance rate of more than 50 percent.

Unlike many other programs, the Certified Angus Beef program does not own cattle or beef products at any stage of production or processing. Instead, the program licenses packers, processors, distributors, retailers, and restaurants to harvest, fabricate, and merchandise Certified Angus Beef product. Financial rewards are derived along the supply chain through the preserved integrity of the brand by tracking product from the cow-calf operation to the processor with a tagging system that is exclusive to the program. To be eligible for the tagging program, cow-calf producers must be certified by the Angus Association as producing animals that are Angus or Angus-cross. Although the existing tagging system is not a complete farm to plate traceability system, it allows for supply chain participants to achieve premiums through the identification of acceptable animals and a value based marketing system.

There is some evidence that consumers are willing to pay a premium for beef with the CAB label. Consumer research conducted in the U.S. in 2002 suggested that consumers may be willing to pay an average premium of U.S. \$2.33/lb for CAB products, compared to generic products (Kovanda and Schroeder, 2003). The success of the CAB brand in the marketplace also indicates that some consumers have responded positively to the brand and this has translated into fed cattle premiums of U.S. \$2-\$5 per-hundred weight. A portion of this premium is typically passed back to the Angus cow-calf producers when calves are purchased by feedlots (Certified Angus Beef Website, 2003). As the focus is on breed, relatively little supply chain coordination is required to preserve product identity and pay participants for the desired attribute. This is because the breed characteristic is visible during the farm-feedlot production process and in the initial stages of processing.

While packers, retailers, and other merchandisers must purchase licenses to market Certified Angus Beef, there are no long-term commitments required by cow-calf producers and feedlots beyond the production of cattle with the requisite breed and carcass quality characteristics. Typically, formal agreements between packers, feedlots, and cow-calf producers are not necessary to ensure a constant supply of beef cattle into the CAB program. This is because the program requirements are broad enough that a relatively large supply of cattle is available through more informal arrangements.

The relatively broad requirements means that entry into the CAB program is easier than other programs, which have more detailed production and quality requirements. As a result, the CAB program has grown to an international scale. However, the program's minimal requirements also mean that more variance is expected in the quality of cattle accepted into the program relative to other branded programs. This implies that the difference in eating quality of Certified Angus Beef, as compared to USDA or Canadian Prime beef, may be more of a perceived difference than an actual difference. Consequently, it is expected that the premiums paid through this program to cow-calf producers/feedlots would be lower than the premiums paid under programs offering more substantial differences in eating quality. Further research into comparative eating quality and market studies that compare branded products would be necessary to determine the validity of this expectation.

2.8.2 *Decatur Beef Alliance*³

Decatur Beef Alliance is a marketing alliance that began in 1994 and is managed by Decatur County Feedyard in Kansas. Decatur County Feedyard is a privately owned feedlot that has been in operation since 1977 and has a one-time capacity to feed 35,000 head of cattle. Approximately 90% of the cattle fed each year are run through the alliance. More than 130 cow-calf producers throughout the United States currently participate in the program and approximately 50,000 head are being processed each year through the alliance. The stated mission of the alliance is to produce consistent, quality beef at the lowest possible cost and provide the highest quality service to both feeders and packers through the use of all available technology and proven techniques. The program aims to avoid “average management” where there is tremendous range in growth patterns and carcass value. Ignoring these differences, by penning cattle together from start to finish in the typical feedlot, creates carcass discounts and inefficiencies in the cost of production. It results in a final product with too much inconsistency in quality. Instead, the Decatur Beef Alliance attempts to manage each individual animal to its optimum genetic endpoint (Weibert, 2004).

The alliance is partnered with the Excel processing plant in Dodge City, Kansas. A quality based grid pricing system uses high premiums and discounts to provide incentives for cow-calf producers to produce high quality, high yielding cattle. The alliance does not own a particular brand, but instead directs its production towards existing brand programs run by Excel, which include Certified Angus Beef, Sterling Silver, and Ranchers Registry. All of these brands focus on providing consistent, tender, and flavourful beef.

The alliance chose not to develop a brand due to the large volumes typically required, the organizational costs and the equity capital needed to develop and market a brand. Production from the alliance is absorbed into the large scale processing capacity of the Excel plant with relative ease. Consequently, the alliance is not limited in what it supplies to Excel on an ongoing basis and there is scope for future growth. This reduces the degree of coordination required to ensure adequate supplies, which is often significant for alliances that are the sole supplier to one particular brand, as they have to ensure an ongoing and constant supply of product. Excel also benefits from the partnership, as the alliance provides a constant, predictable, flow of cattle into the plant and into Excel’s high end programs, reducing the time spent searching for and procuring cattle.

Program requirements for cow-calf producers are minimal. Specific production protocols are not required, but instead recommended production guidelines are provided in an effort to enhance cow-calf producers’ returns. They must commit a minimum of sixty head of cattle of the same sex into the alliance and are charged an alliance fee of \$5/head and an additional \$0.02/head/day on feed. The feedlot is flexible in terms of the ownership of cattle and will purchase up to a one-half interest in cattle entering into the alliance in order to reduce the capital commitment required by cow-calf producers. Currently about forty percent of cow-calf producers retain ownership and the feedlot partners with the remaining sixty percent of suppliers.

Cow-calf producers can enter the program at anytime. Once their cattle are entered into the program, producers must sign a feeding agreement stipulating that the cattle are part of the alliance and that the feedlot is responsible for marketing the cattle, which occurs on the basis of individual animal performance. Cattle are tagged with an electronic

³ This section is based on discussions with Warren Weibert of Decatur Beef Alliance (Weibert, 2004).

identification tag upon entering the feedlot. Once cattle have been in the lot for 70 days they are sorted twice based on different quality indicators and commingled in mixed ownership lots in order to optimize cattle performance on the grid. Therefore, an individual's cattle may be in several different lots and will be sold at different times. The electronic identification tags manage information on an individual animal basis.

Electronic identification and commingling are intended to avoid the problems associated with keeping one cow-calf producer's cattle in a separate lot throughout the production process, which often results in inefficient lot sizes and groups of cattle that vary in terms of weight and finishing times. The sorting process uses the Micro Beef Technology ACCU-TRACTM Electronic Cattle Management System, which allows the feedlot to measure and sort individual cattle based on different quality and economic indicators. The feedlot invested approximately U.S. \$650,000 to implement the ultrasound technology and sorting system and pays a yearly license and data management fee to Micro Beef.

In addition to implementation costs, the feedlot alliance has higher ongoing costs from the increased management and sorting that occurs in the program. The alliance fees help offset the increased management and marketing costs and the cost of the electronic identification tag. While the feedlot receives some payback directly, the system also enhances the paybacks received by cow-calf producers and the quality of information flows. Cow-calf producers that perform well within the alliance usually increase the number of head they enter into the program, and they also typically evolve to retaining ownership. For the feedlot, less time is spent procuring cattle; they have a more constant income stream as a result of custom feeding fees, and are able to operate at an optimum capacity.

Cow-calf producers participating in the program are located throughout the United States. Feeder calves are fed at Decatur and then sent to the Excel processing plant in Dodge City. Besides premiums, the alliance is providing cow-calf producers with data on carcass performance. When all of the animals from a cow-calf producer have been sold, the producer receives individual animal close outs that include feedlot performance, measured carcass data and the programs that individual animals were allocated to, a net return statement based on premiums received and costs incurred, and a report that compares an individual's cattle to others in the alliance. Especially significant is the focus on the overall net return rather than just the premiums received, as this balances premiums against the increased costs incurred to obtain those premiums. Excel provides the alliance with weekly market access and manages the data through an in-house electronic tracking system. There is no written contract or commitment between the alliance and Excel in terms of the number of cattle to be supplied. Consequently, the alliance can focus on selling cattle based on their optimal finishing times. Furthermore, it does not have to spend a great deal of time gathering and managing data from several different processors.

The Decatur Beef Alliance is a fairly flexible marketing alliance. Cow-calf producer requirements are low and commitment to the program is limited to one production cycle. Alignment with one processing plant and its programs reduces the marketing required by the alliance and allows for the formation of an ongoing partnership that benefits both the alliance and the packer. Currently the alliance is growing at a rate of 10-15% each year and has been quite successful in achieving its goal of producing high quality cattle that return premiums to the cow-calf producer in addition to the provision of quality information.

In 1999, 99.74% of the cattle marketed from the alliance had a yield grade of 3 or better, 57% made Choice grade or better, and 97% made Select grade or better. Outliers in the program, which did not make a grade, totaled 3.37% compared to an industry average of 9.71% (Decatur Beef Alliance Fact Sheet, 2003). Hitting such a high quality target resulted in participants receiving average premiums of U.S. \$15/head. Timely marketing on the grid resulted in additional producer premiums of U.S. \$5-10/head (Decatur Beef Alliance Fact Sheet, 2003).

2.8.3 *Ranchers Renaissance*⁴

Ranchers Renaissance is a new generation closed cooperative owned by ranchers that are mainly concentrated in Texas and Colorado. It commenced operation in 1997. Ranchers Renaissance is a vertically aligned beef production system based on the creation of partnerships between ranchers, feeders, a processor (Excel), and retailers. The stated goal of the cooperative is to bring together industry participants to better understand the consumer, lower costs, share information, improve quality, and share in the additional value created by a branded beef program.

The cooperative uses a value-based marketing system where producers and others in the supply chain are paid for a high quality product. Products are sold under several brand labels including King Soopers' Cattleman's Collection, Harris Teeter Rancher, Sobey's Select, and Safeway's Angus Ranchers Reserve. All of these brands guarantee their beef products to be consistent, tender, and flavourful. The cooperative does not own a brand name label. The costs of developing a brand name and obtaining shelf space have deterred Ranchers Renaissance from pursuing this option.

Unlike marketing alliances, which often focus on guaranteeing attributes that are measured under existing government grading programs, producer-driven cooperatives, such as Ranchers Renaissance, tend to rely less on current grading standards as a measurement of quality and have more detailed program specifications. In a new generation cooperative, members are driving the program and can more readily observe whether program specifications are met. They may also be more motivated to follow program requirements given that they own the program and will profit directly from its success as the residual claimant.

Twenty-three quality control points verifying genetics, source, production and processing procedures, and feed programs have been implemented to provide consumers with a consistently tender product. Third party verification ensures that all members comply with program specifications and electronic ear tags are used to collect data, which is then shared among all segments of the supply chains.

As a closed cooperative, membership is required to produce beef under the Ranchers Renaissance program. Membership is broken into two classes, A and B, which are based on the number of cattle supplied to the program. In order to be in Class A, members must provide a high volume of animals, whereas the volume requirements are lower for Class B members. Fees vary based on membership class, with class A members, paying a one time entry fee of U.S. \$25,000 with the fee moving as low as U.S. \$2,500 for other members. Currently, several Class A members individually own and process around 30,000 head of

⁴ This section is based on information drawn from the Ranchers Renaissance Website (2003), Percy (2000) and the International Beef Industry Congress (2003), as well as discussions with John Butler, President and CEO of Ranchers Renaissance (Butler, 2003).

cattle through the program each year. Higher initial investments are required for larger suppliers as they are providing a large percentage of the animals that flow through the program. Their long-term commitment is necessary to reduce variability in quality and to ensure the long-term stability of the program.

New members are interviewed in order to ensure their operations fit within the program and that they are willing to provide a long-term commitment to the program. Their operations are also audited by a third party to ensure that they comply with all production standards and program regulations. In addition to initial inspections, evaluations of all ranchers, feedlots, and the packer are performed yearly. An annual fee of U.S. \$3 per head is also assessed in order to cover promotion and administration costs.

Ranchers are required to commit a minimum number of cattle each year based on a three year rolling average of their prior commitments. Each feedlot has to guarantee feeding space to a certain number of Ranchers Renaissance cattle in addition to paying an initial membership fee similar to that paid by cow-calf producers. Every lot of cattle is contracted with Excel in order to coordinate production and ensure a constant flow into packing plants. Contracts are used to ensure the commitment between Ranchers Renaissance and the packer and retailer. A mutual partnership also exists with these partners, as they both have an incentive to maintain their relationship with the program. The processor gains from the premiums received, and retailers gain from selling a differentiated beef product that increases meat sales revenue and encourages customer loyalty.

The long term commitment of all participating members has been cited as the most important element for success of the program (Butler, 2003). An incentive-based grid pricing system is used to reward all supply chain members, with payments based on the end performance of cattle. In 2003, Ranchers Renaissance processed over 200,000 head of cattle and has achieved over 30 percent growth since production began in 2001.

New generation cooperatives such as Ranchers Renaissance are structured so that the activities of all supply chain participants are coordinated. This means that there should be transparency of information along the entire system. The commitment of supply chain members is encouraged through the use of formal arrangements such as contracts and equity investments. This differs from licensing and packer-owned programs where more informal arrangements are used between supply chain partners. As will be discussed in section 3, this higher level of commitment protects the specialized investments that have been made to meet the detailed production and processing requirements of the programs.

2.8.4 *Future Beef Operations*⁵

Future Beef Operations was a comprehensive production to retail beef system with close vertical coordination along the supply chain. It was initiated in the U.S. in 2001 but survived for less than a year. Nevertheless, it provides an interesting example of an alternative ownership structure to coordinate a branded beef program. Similar to Ranchers Renaissance, Future Beef Operations tried to bring together all members of the supply chain, but was different in that the program was neither producer nor packer driven. Instead, a new corporation was formed with major investors coming from different sectors of the beef industry.

⁵ Information for this section was drawn from Bastian (2001); Ishamael (2002) and Kovanda and Schroeder (2003).

Future Beef Operations intended to coordinate genetics, production, and processing to deliver consistent high quality beef products tailored to a major chain of retail stores. To achieve this, investors from the industry were brought together to build a new processing and packing plant that would supply 1,700 Safeway stores in North America with branded beef products. They then partnered with feedlots and cow-calf producers using a grid pricing system to provide incentives for producing high quality cattle. While the system of coordination was very similar to that of Ranchers Renaissance, it differed in that cow-calf producers did not retain ownership. Also, significant investment was incurred to build a plant, whereas Ranchers Renaissance does not own any cattle or processing facilities and is merely a non-profit organization facilitating the production of branded beef products. Future Beef Operations also differs from a marketing alliance in that it was not initiated by an existing industry player.

Less than a year after Future Beef Operations began production it filed for bankruptcy and ceased operation. There are several reasons behind the demise of Future Beef Operations, some of which are related to the structure of the program. The company had an exclusive contract with Safeway and no other customers. This left them vulnerable to the retailer reneging on the contract. They failed to adequately address risk within their contract with Safeway, and when Future Beef began to lose money, Safeway backed away from the risk sharing arrangements that existed. The failure of Future Beef Operations does not mean that this type of management structure is not viable, but issues can arise that would not arise under the structures outlined above. A key weakness appears to be that the initiative was not led by an existing retailer, processor or cattle supplier, such that there may have been a lack of commitment from different supply chain participants and an overly short-term focus.

Future Beef Operations invested in the construction of a new processing plant, which was intended to process large volumes of cattle. At the same time, relatively loose formal agreements were in place with their supply chain partners. As a result the company was vulnerable. This vulnerability was enhanced by the fact that Future Beef Operations had focused specifically on the production of beef for one retailer, Safeway, while not ensuring the commitment of that retailer to the project. Of the total U.S. \$50 million invested into the project no single investor held more than a 20 percent stake in the operation. When economic losses were incurred in the first year supply chain members began to shy away from the venture, which resulted in the system falling apart.

Losses are common in the first year of a new venture due to unexpected problems and additional costs that may arise. Partners in the system must be committed to making the system work. Typically, due to the large investments made by members, a long term commitment is created. This was the case for Ranchers Renaissance where losses were incurred in the short-run, but sunk investments resulted in supply chain members having a long term focus and a commitment to the program that enabled it to succeed. Future Beef Operations had incurred significant investments, but did not have sound relationships among its various partners through contracts or adequate equity commitments to protect these investments. This type of structure could be viable, but it requires that all supply chain members be committed to the venture via well-constructed contracts and equity investments that provide for long term stability.

3 A FRAMEWORK FOR ANALYSING SUPPLY CHAIN COORDINATION

This section presents a framework for analysing supply chain coordination in the beef industry based on Transaction Cost Economics. The ‘transaction costs’ of different coordination methods will be influenced by the attribute being branded. This means that different alliance structures are likely to be more successful than others in delivering a branded beef program with specific quality assurances. The framework developed in this section is used to design survey questions for cow-calf producers and industry stakeholders to investigate potential barriers to the development of supply chain alliances and how these barriers can be overcome.

3.1 Understanding Transaction Costs

The costs of carrying out a transaction include information (search) costs, negotiation costs and monitoring and enforcement costs. *Information or search costs* arise in the search for information about prices, inputs, and buyers or sellers. *Negotiation costs* are associated with the actual transaction, including negotiating and writing contracts or using an intermediary to facilitate a transaction. *Monitoring and enforcement costs* arise after an exchange has been negotiated when it may be necessary to monitor the quality of goods from a supplier or monitor the behaviour of a buyer or seller to ensure that all the conditions of the transaction are met. Enforcement costs are incurred if it is necessary to legally enforce an agreement.

Both production costs and transaction costs affect the method of vertical coordination that emerges. For example, if the quality attribute being branded relates to on-farm production methods (feeding, humane animal treatment), the search and monitoring costs of assuring that the beef was actually produced in this manner are likely to be very high if those transactions occur through a series of uncoordinated spot markets where very little information is available. Closer vertical coordination through a marketing alliance or a new generation cooperative makes that information easier to obtain and is therefore likely to be a more transaction-cost efficient form of vertical coordination.

What determines the level of transaction costs? Three key factors are important: the degree of uncertainty surrounding a particular transaction, the frequency with which transactions occur, and the degree to which there are asset specific investments (Williamson, 1986).

Specific assets have little or no value in an alternative use or with an alternative user. Once these investments have been made, the firm effectively becomes locked into the supply relationship and is vulnerable to the other party acting opportunistically to renege on the pre-agreed terms of the transaction. In the beef sector, such investments can include improved herd genetics, specialized inputs related to the production process, computer chips to maintain the identity of individual animals during production and processing, new processing technologies, and the development of specialized managerial skills. These investments are asset specific if they are tailored to a particular partner (buyer or seller). Few firms would make investments in specific assets and subsequently only rely on spot market transactions to sell their output because of the risk of a buyer reneging on the transaction, knowing that the seller has few or no alternative buyers. Instead, investments in specific assets are usually ‘safeguarded’ by the development of long-term supply

relationships that provide a stronger assurance that the other party will not act opportunistically.

As consumers' tastes become more diverse, a variety of animal types with a different but specific set of characteristics are required. This means that producers and feedlots must tailor their output to the needs of individual production programs, which can result in increased production costs. Ideally, the increased costs should be more than offset by premium prices received for the production of the desired attributes, but the production of a specialized product has two effects. First, it removes the producer from the competitive open market where prices are determined by market forces and into a smaller market with fewer buyers. In this situation prices must be negotiated on an individual basis with the buyer and, once the investment has been made, the buyer could act opportunistically. Second, it leaves the farmer with a specialized product that could be heavily discounted by other buyers with different production requirements (Hobbs et al., 1996a).

Buyers can also be vulnerable to opportunistic behaviour by sellers if they have product commitments to meet further down the supply chain with their customers. Spot markets may not provide a sufficient assurance that their demands for specialized inputs will be filled without incurring high information/search costs. Contracts or alliances are likely to be preferred to spot markets where the risks of opportunism are high.

Uncertainty can arise for a variety of reasons, including the length of the relationship, market conditions, and lack of information about product quality. Uncertain demand and supply conditions encourage firms to look to longer-term coordination arrangements. Incomplete information about product attributes generates uncertainty. Currently, cattle in the spot market system are priced based on the average quality of a lot (group) of cattle, but the quality of individual animals can vary significantly within a lot of cattle. This creates quality uncertainty. Increased coordination allows for pricing to move away from an average lot quality basis and facilitates pricing based on product attributes that cannot be assessed through visual inspection. Uncertainty over product quality reduces the average price that buyers are willing to pay.

The *frequency* of transactions can also affect vertical coordination. Firms have an incentive not to tarnish their reputation by acting opportunistically when transactions are expected to occur frequently and they value future business. Frequent transactions also allow for the increased transfer of information between transacting parties. If transactions occur only infrequently, there may be an incentive to act opportunistically and exploit any information asymmetry. Closer vertical coordination may again be a means of mitigating the incentives for opportunistic behaviour.

3.2 Search, Experience and Credence Attributes

A wide variety of attributes are currently being provided in branded beef products. It is useful to distinguish between search, experience and credence product attributes. *Search attributes* can be evaluated prior to purchase by visual examination, touch, or smell. Examples include appearance, convenience and product presentation, USDA or CFIA grade, and (visually verifiable) leanness. In the analysis below, convenience and leanness are included as search attributes. Government grades and appearance are relatively standard across all branded beef programs producing a high quality beef product. Leanness is important as consumers are increasingly health-conscious and demand products with lower levels of fat. Convenience is also an important search attribute. Increasing participation of

women in the labour force means that there is reduced time available to prepare meals and that consumers are looking for convenient meal solutions.

The quality of *experience attributes* can only be determined after purchase when the product is consumed. Firms rely on having a good reputation with consumers to obtain repeat purchases. As a result, they have a stronger incentive to disclose product quality and continually provide that quality. The most common experience attributes that are branded include freshness, consistency, and tenderness. Tenderness is the most common attribute currently being branded. Some consumers have not been satisfied with the tenderness provided under the existing grading system and have turned to purchasing brands that provide a guarantee of tenderness. Freshness and consistency are not included in the analysis below as these characteristics do not tend to vary across branded programs. A high quality brand typically implies that a product will be fresh. Quality, however it is defined, should be consistent in a branded product; this is the essence of a brand guarantee.

Credence attributes cannot be detected by a buyer even after they have purchased and consumed a product. Typically this occurs when branded attributes are process attributes which do not alter the physical attributes of the product. Labelling and a certification or verification process is often necessary to ensure firms are providing the quality they have guaranteed consumers.

Common credence attributes in branded beef products include no hormones and antibiotics (natural), organic, free of genetically-modified organisms, grass fed, enhanced food safety, animal welfare friendly, environmentally friendly, source verification, and process verification. These attributes have emerged due to increasing consumer concern over the safety of the food they consume, environmental awareness, and heightened interest in farm animal welfare. Source verification and process verification are unique in that they are not tangible attributes, but enable individuals to confirm the presence of credence attributes. They are increasingly becoming an aspect of many branded programs. Breed and product origin, other commonly branded credence attributes, arise from consumers' association of superior quality with particular breeds of cattle or specific production regions. Up to the processing level, these attributes could be classified as search attributes and are relatively easy to verify. After processing and at the consumer level, however, breed and product origin cannot be easily detected, resulting in their classification as credence attributes. The distinction between search, experience and credence attributes has important implications for the types of transaction costs that are likely to arise.

A branded beef program usually includes a combination of attributes. Based on a review of U.S.-based alliances identified by Kovanda and Schroeder (2003), it is apparent that natural, organic, and tenderness are three core underlying attributes of branded beef programs⁶. Natural and organic programs are provided in response to consumer concerns over health, with additional quality attributes to meet demands for higher food quality, animal and environmental welfare concerns, and other production method assurances. Tenderness programs are a response to the demand for increased consistency in the palatability and eating quality of beef. Additional attributes often included in tenderness-based programs include grass fed, enhanced food safety, leanness, product origin, breed,

⁶ Natural products are guaranteed to contain no hormones or antibiotics. Organic products are guaranteed to be produced using no synthetic chemicals (i.e. pesticides, fertilizers, genetically modified organisms, and other growing aids).

convenience, and source and process verification. Breed and product origin are often provided in addition to tenderness, and are frequently included as proxy indicators of eating quality.

The three major market directions of branded beef programs: natural, organic, and tenderness is a useful distinction in understanding how different transaction costs arise and how these transaction costs affect the type of supply chain alliance that emerges. The implications of these branded attributes on two key determinants of transaction costs: asset specific investments and uncertainty, is explored below⁷.

3.3 Branded Programs and Asset Specific Investments

Three types of asset specificity exist. The first is site specificity, in which agents in a supply chain are in a fixed relationship to minimize transportation costs or produce a region specific product and assets are immobile due to program restrictions or high costs. Site specific investments are apparent for attributes such as product origin or environmental preservation. In the case of product origin, supply chain participants must be located in a specific region to use a region specific brand name that consumers associate with high-quality products. Examples of this type of branded program include Alberta Beef and Nebraska Corn-fed Beef, which are promoting their province/state as the origin of high-quality beef products. The branding of environmental preservation often requires that transportation distances are minimized and production does not occur in regions that are environmentally sensitive. This results in investment in specific sites that are located near other participants and in compliance with environmental requirements. Firms are vulnerable when site specific investments are made because they cannot easily switch production once resources specific to a regional brand have been developed.

The second type of asset specificity is physical asset specificity, which refers to relationship specific investments in physical assets such as feed and health protocols, genetics, capital improvements, and technologies associated with food safety and the testing, grading, and processing of beef. These investments are 'specific assets' if they are tied to a particular buyer or peculiar to a particular branded program. Credence beef products, such as natural beef, typically require that cow-calf producers, backgrounders, and feedlots invest in specialized feed and health protocols that eliminate the use of certain inputs, such as growth hormones and antibiotics. Instead, other regimes are substituted that are often more expensive and require a longer production period. The provision of credence attributes in branded products may also require that packers invest in technologies to test for the presence/absence of particular inputs in order to reduce the incentive to cheat. For those products that provide additional assurances of animal welfare and environmental preservation, cow-calf producers, feedlots, and packers may be required to make physical improvements to their operations in order to upgrade and comply with guidelines.

A specific investment in physical assets is also required when producing experience and search attributes associated with high-quality tender products. Producers often invest in specific breeds and genetic lines, as some breeds have been associated with producing more tender beef and some branded beef programs are based on a specific breed. It is important

⁷ Transaction frequency is a third transaction characteristic that is often considered. However, the frequency of transactions is essentially constant across all branded beef attributes.. Therefore, the effect of transaction frequency on transactions costs, as a result of the production of different attributes, is expected to be minimal and is not included in the analytical framework.

to note that a producer will probably only participate in a breed-based program if they already produce a particular breed. As a result, (new) investments in breed are less common, as it is unlikely that a producer will adopt a completely new production system. Instead they will be concentrate on making ongoing improvements in their herd genetics.

Often, tenderness-based branded programs also require producers and feedlots to invest in feed protocols to improve meat quality and consistency. Packers use technology associated with testing, grading, and processing beef in tenderness programs to sort incoming cattle, measure tenderness and consistency, and improve overall product quality.

The third type of asset specificity is human asset specificity. This occurs when producers, feedlots or packers have invested in specialized training or knowledge to produce the branded product. This may be the case with some production and management protocols, record keeping, and certification processes.

For credence attributes, quality cannot be identified easily through testing, and a certification process and record keeping are usually required. These systems may require a large investment of time, specialized management skills, and technologies. Although this is not usually necessary for an experience or search attribute, the production of tenderness and leanness nevertheless require supply chain participants to invest time and knowledge to create detailed production and management plans. These plans typically outline a purchasing protocol and how animals will be managed during the production process to maximize performance and quality. Investment into human resources may also be required to develop management plans that ensure proper procedures are in place to provide animal welfare and environmental preservation attributes.

Table 2 provides a summary of the asset specific investments required to produce different branded beef attributes. The attributes are further identified as search, experience and credence attributes. It is clear that certain attributes require common specific investments, which may make it conducive to provide these attributes in combination under a branded beef program and implies that the cost of providing an additional attribute may be relatively small. Another attribute will only be added if the additional costs incurred as a result of the increase in asset specificity are offset by an increase in consumers' willingness to pay.

As the degree of transaction specific assets increases, negotiation costs are expected to increase. Participants will move away from transacting in the spot market towards increased vertical coordination and long-term relationships to protect asset specific investments and reduce the risk of opportunistic behaviour. Increased coordination and higher negotiation costs will also arise when the number of attributes in a branded program increases if this requires further asset specific investments.

Table 2 - Asset Specific Investments and Branded Beef Attributes

Attributes	Site	Physical	Human
Natural (C)		Feed/Health Protocol	Records/Certification
Organic & GM Free (C)		Feed/Health Protocol	Records/Certification
Grass Fed (C)		Feed Protocol	Records/Certification
Enhanced Food Safety (C)		Feed/Health Protocol, Testing/Grading/Processing Technology	Records/Certification Prod/Mgmt Protocol
Animal Welfare (C)	Yes	Physical Improvements	Records/Certification Prod/Mgmt Protocol
Environmental Preservation (C)	Yes	Physical Improvements	Records/Certification Prod/Mgmt Protocol
Source & Process Verification (C)			Records/Certification
Product Origin (C)	Yes		Records/Certification
Breed (C)		Genetics	Records/Certification
Tender (E)		Genetics, Feed Protocol, & Testing/Grading/Processing Technology	Production/Management Protocol
Lean (S)		Genetics, Feed Protocol, & Testing/Grading/Processing Technology	Production/Management Protocol
Convenience (S)		Processing Technology	

*C – Credence Attribute**E – Experience Attribute**S – Search Attribute*

3.4 Branded Beef Programs and Uncertainty

The second transaction characteristic that affects supply chain coordination is transaction uncertainty. Uncertainty can be broken down into four main categories: information asymmetry, incomplete information, price uncertainty associated with quality variability, and price uncertainty associated with the number of buyers in a market.

3.4.1 Information Asymmetry

Information asymmetry arises when one party to a transaction has more information than another party; for example, a feedlot has more information about feeding practices than

a packer. The verification of production and processing practices may be difficult if there are information asymmetries between supply chain participants, particularly in the case of credence attributers. Table 3 indicates where information asymmetry arises at different levels of the beef industry⁸.

In the case of branded natural beef, for example, production practices have to be monitored to ensure that the final product is in fact “natural”. Cow-calf producers and feedlots have an incentive to cheat by using growth-hormones and antibiotics in order to capture the premium associated with an increased consumer willingness to pay for natural products without incurring the costs. Monitoring may be needed at all stages of the supply chain for attributes such as enhanced food safety, environmental preservation and animal welfare assurances. Cow-calf producers, backgrounders, finishing feedlots, and packers could use prohibited feeds or avoid the costs associated with complying with higher environmental and welfare standards, while capturing the premiums associated with these higher standards.

Table 3 - Information Asymmetry and Branded Beef Attributes

Attribute	Information Asymmetry		
	Cow-calf producers	Feedlots	Processors
Natural (C)	Yes	Yes	
Organic & GM Free (C)	Yes	Yes	
Grass Fed (C)	Yes	Yes	
Animal Welfare (C)	Yes	Yes	Yes
Environmental Preservation (C)	Yes	Yes	Yes
Product Origin (C)	Yes	Yes	
Food Safety (C)	Yes	Yes	Yes
Breed (C)			Yes
Tender (E)			
Lean (S)			
Convenience (S)			

C – Credence Attribute E – Experience Attribute S – Search Attribute

When credence attributes and information asymmetry are present, a traceability or quality verification system is often needed to verify that production and processing practices are followed. In the absence of an effective quality verification system, transaction costs arise. Increased information costs arise when supply chain participants cannot detect an attribute and instead focus on determining the reputation of other supply chain partners so as to minimize the risk of cheating. Monitoring costs are also expected to increase if information asymmetry extends across a number of production stages. For example, producing natural beef requires that only cow-calf producers and feedlots are monitored, while producing environmentally friendly beef requires monitoring of the cow-calf, feedlot,

⁸ For the purposes of this analysis, seedstock producers are grouped with cow-calf producers, and backgrounding feedlots are grouped with finishing feedlots.

and packer. As information and monitoring costs increase, the cost of transacting through the spot market will rise and supply chains become more closely coordinated.

Certification institutions can reduce monitoring costs by developing a common set of industry-wide standards. For example, organic certification institutions act as a neutral third party to ensure that organic standards are satisfied at various stages of the supply chain. If these institutions were not in place, buyers would have to implement their own systems to monitor sellers. This would likely be more costly as industry-wide standards would be replaced with numerous different individual sets of standards.

3.4.2 Incomplete Information

Incomplete information arises when neither party to a transaction has full information about the presence of a particular attribute. For example, this may occur in the case of leanness and tenderness: attributes that are difficult to measure or predict prior to slaughter. In these cases, payment is typically made on a live weight basis rather than a quality basis. Although proxy variables for the attributes are often used in a live weight pricing system, they can be poor indicators of actual quality. As a result, incomplete information regarding attribute quality exists. The presence of incomplete information has one main effect. Producers and feedlots that are paid on a live weight basis are not penalized for producing lower quality products and are not rewarded for producing higher quality products. Consequently, there is little incentive for them to follow program guidelines put in place to reduce variability and improve product quality. Transactions costs will be incurred to obtain the desired attributes.

Technologies exist to measure for tenderness and leanness when the animal is still alive, however, these technologies are relatively new and expensive, and are used infrequently. Instead, monitoring and supplier reputation information is relied upon to reduce variability and increase product quality: these activities incur information costs. Packers (feedlots) will focus on determining whether or not feedlots (cow-calf producers) provide a product that is of the right quality. For transactions with a feedlot, a packer can (to some extent) measure tenderness and leanness upon purchase. This means that feedlots have an incentive to maintain a positive reputation with packers. The effect of reputation on transactions between packers and feedlots suggests that information costs will be lower between feedlots and packers than between cow-calf producers and feedlots. In the latter interface, information regarding reputation is more difficult to obtain because quality (viz. leanness and tenderness) cannot be determined even at purchase. Transactions are also more numerous and infrequent due to the large number of small cow-calf producers.

For programs that brand tenderness, monitoring costs also arise. Even after processing, the actual level of tenderness cannot be completely guaranteed, as measurements are often based on proxy variables. Technologies exist to measure tenderness at processing, but thus far they have not been implemented on a commercial basis due to the high costs of implementation. Furthermore, the identity of an individual product cannot be easily traced back from the consumer to the feedlot or cow-calf producer. If consumers dislike a product they may switch away from the brand entirely, and demand signals will fail to differentiate between high and low quality. Therefore, production and processing standards are often implemented that reduce quality variability and raise tenderness levels to ensure consumer satisfaction. These standards must be monitored in order to ensure compliance, as there is an incentive to cheat given the limited ability to track

tenderness throughout the supply chain. High monitoring costs are a disincentive to use spot markets.

Institutions to reduce the level of incomplete information and improve the transfer of product quality information along the supply chain include grid pricing initiatives that allow the transfer of product quality information back to both cow-calf producers and feedlots. This results in a realignment of incentives, as cow-calf producers and feedlots are penalized for the production of poor cattle and rewarded for the production of high quality cattle. Consequently, less monitoring is required.

3.4.3 Price Uncertainty – Quality Variability

Price uncertainty can arise as a result of the variability in quality of experience and search attributes (i.e. tenderness and leanness). Although general market prices may be apparent, the final price received cannot be easily predicted given uncertainty over final quality. Even when a grid pricing system is implemented cow-calf producers and feedlots will not know the price they will receive until after the final processing is complete. Sellers incur information costs in an effort to reduce price uncertainty. Negotiation costs also arise in establishing agreements that minimize price uncertainty and reduce the risk of a seller not obtaining their reserve price. It is expected that as price uncertainty increases, and consequently price discovery and negotiation costs increase, closer vertical coordination will emerge to reduce this uncertainty and minimize the associated transaction costs.

3.4.4 Price Uncertainty – Number of Buyers

The number of alternative buyers available also affects price uncertainty. The risk of selling at a reduced price increases when there are a smaller number of buyers resulting in a reduction in sellers' bargaining power. Only general estimations of the number of buyers can be made, based on information pertaining to the largest branded beef alliances currently operating in the U.S. Information gathered by Kovanda and Schroeder (2003) enables an estimation of the most common combinations of attributes currently being branded. Although they do not identify the number of buyers for each particular attribute, the information provided by the authors' is used in Table 4 to estimate the expected size of the market in terms of small, medium or large numbers of buyers. Twenty-five of the 32 programs identified by Kovanda and Schroeder (2003) were examined (information on the other seven programs could not be found). The number of branded programs identifying a particular attribute was divided by twenty-five to obtain a percentage value. This value is an approximation of the proportion of branded beef programs that include a particular attribute.

The number of buyers provides a rough indication of 'market size'. Programs with a zero percentage were very rare and were not considered in the identification of the largest U.S. branded beef programs by Kovanda and Schroeder. Predicted market size, as measured by the estimated number of buyers, was categorized as being either small (0-30% of branded beef programs), medium (30-60% of branded beef programs), or large (60-100% of branded beef programs). Small markets, with few downstream buyers, are niche markets that exist on a small-scale in the North American beef industry. Medium sized markets are those that have several buyers along the supply chain. They produce branded beef products that are growing in demand, but still only capture a small portion of the total market share of beef. Large markets are those that produce branded beef products with attributes that

appear to have the strongest demand among consumers. Consequently, there are a large number of buyers in these markets.

Table 4 - Predicted Market Size in Terms of Number of Buyers

Attribute	Branded Programs	Percentage⁹	# of Buyers	Price Uncertainty
Natural	8	32	Medium	Medium
Organic & GM Free	0	0	Small	High
Grass Fed	1	4	Small	High
Enhanced Food Safety	0	0	Small	High
Animal Welfare	3	12	Small	High
Environmental Preservation	2	8	Small	High
Product Origin	2	8	Small	High
Source Verification	0	0	Small	High
Process Verification	0	0	Small	High
Breed	12	48	Medium	Medium
Tender	22	88	Large	Low
Lean	5	20	Small	High
Convenience	0	0	Small	High

Source: Adapted from information in Kovanda and Schroeder (2003)

Table 4 indicates that the number of buyers for the majority of attributes is expected to be small. Breed and natural attributes are the exception, with a ‘medium’ market size in comparison with the other programs. Also, for tenderness the number of buyers is expected to be large. It should be noted that this table does not take account of the transaction interface (cow-calf producer/feedlot or feedlot/packer).

As market size decreases, we expect sellers to incur higher information costs. Sellers operating in a market with a small number of buyers will have to spend more time searching out buyers, identifying their specifications, and obtaining price information. In a smaller market, with fewer buyers, increased costs will also be incurred to determine a buyer’s reputation and whether or not they are likely to act opportunistically, for example by paying a lower price than was initially agreed.

When a small number of buyers exist, negotiation costs will also be incurred to reduce the risk of opportunistic behaviour and to reduce the risk of price uncertainty. Price uncertainty is expected to increase as the number of buyers in a market decreases. With fewer buyers there is a higher risk that sellers will not be able to obtain the price they expected for their product. In an effort to protect themselves against the risks associated with opportunistic behaviour and price uncertainty, sellers will spend increased time and expense negotiating with buyers to establish an agreement that minimizes their risk. With a smaller number of buyers, asset specific investments by sellers are more vulnerable to opportunism by buyers.

⁹ Percentages were calculated by dividing the number of branded beef programs that provide a particular attribute by the total number of programs identified (25) by Kovanda and Schroeder (2003).

3.4.5 Number of Sellers

The number of sellers available also has an impact on the degree of supply chain coordination. With fewer sellers for a particular attribute, processors face increased risks that they will not be able to procure a constant supply of product. This limits their ability to establish supply agreements with retailers and other end-users for a specialized product. With fewer sellers, buyers face higher information costs as they may spend more time searching out suppliers and determining their reputation. Negotiation and enforcement costs will also be higher, if the buyer feels the need to reduce their exposure to opportunistic behaviour by the seller.

It is apparent that number of buyers and sellers in a market can cause transaction costs to increase as the number of buyers and sellers decrease. Hence, it is likely that as market size becomes smaller and transaction costs increase, supply chain participants will choose closer coordination to minimize transaction costs. The degree of coordination will be affected by the level of asset specificity required to produce a particular attribute. Smaller market size and the associated higher transaction costs are relatively less important in situations where the degree of asset specific investments is low.

3.5 Additional Factors: Critical Stages

Beyond the two core transaction characteristics of asset specificity and uncertainty, two additional influences on branded beef programs and coordination can be considered: (i) the stages in the supply chain that are critical to the integrity of the branded attribute, and (ii) the role of source and process verification.

If several stages of the supply chain are critical to the integrity of the branded attribute, there is an increased number of transactions where information must be transferred between participants. Downstream buyers require information on the quality of inputs, and in some cases upstream suppliers also need to obtain information on end-product quality. The ease with which information is transferred depends on the type of attribute being produced, with the costs being highest for credence attributes and lowest for search attributes.

Table 5 identifies the supply chain participants (stages) that influence the provision of different branded attributes. For example, natural beef requires that no hormones or antibiotics be used, which occurs in the production stages. Therefore cow-calf producers and feedlots play critical roles in the provision of this attribute. Tenderness can be affected by genetics, feed, other factors in the production process, but also by processing techniques. When guaranteed tender product is produced, all of these stages (cow-calf producer, feedlot, and processor) need to be involved, and information verifying these practices must be transferred along the supply chain.

Table 5 –Critical Stages in the Production of Branded Beef Attributes¹⁰

Attribute	Cow-Calf	Feedlot	Processor
Natural (C)	X	X	
Organic & GM Free (C)	X	X	
Grass Fed (C)	X	X	
Food Safety (C)	X	X	X
Animal Welfare (C)	X	X	X
Environmental Preservation (C)	X	X	X
Source Verification (C)	X	X	X
Process Verification (C)	X	X	X
Product Origin (C)	X	X	
Breed (C)	X		
Tender (E)	X	X	X
Lean (S)	X	X	
Convenience (S)			X
<i>C – Credence Attribute</i>	<i>E – Experience Attribute</i>	<i>S – Search Attribute</i>	

3.6 Additional Factors: Source and Process Verification

Source and process verification are components of several branded beef programs in response to increasing consumer interest in the verification of beef product attributes. Some new source verification and traceability systems require investments into specialized I.D. technologies (tags, microchips, etc.), scanners, and data management systems. The investments may be vulnerable to opportunistic behaviour if they are specific to one program or a limited number of buyers. At the same time, these systems often facilitate easier monitoring and tracking along the supply chain, which can offset the increase in transaction costs associated with opportunistic behaviour. In the long run the implementation of a traceability system is expected to reduce information costs. The creation of a comprehensive information management system increases the ease with which information is transferred between supply chain participants.

3.7 Overview of Transaction Characteristics

Table 6 provides an overview of transaction characteristics and their relationship with different branded beef attributes. Several conclusions can be drawn from the table.

¹⁰ For simplification, seedstock producers, background feedlots, and the retailer are excluded. Finishing feedlots and background feedlots have a very similar influence on the production of particular attributes. Seedstock producers and commercial cow-calf producers also have a similar influence on the production of product attributes. Therefore, these are grouped accordingly. Retailers are also excluded from this table as their influence on the production of particular attributes is minimal. However, this should not imply that retailers are unimportant in branded beef programs. Retailers form the critical link with the final consumer.

First, the transaction characteristics associated with all credence attributes are very similar. Information asymmetry exists when producing any credence attribute. Consequently, the branding of any credence attribute implies that some sort of traceability or identity preservation system will be required. The structure of such a system will depend on whether external institutions already exist for monitoring the production and processing of a particular attribute or whether a new traceability system has to be developed that is specific to an individual supply chain. In addition, the number of buyers and/or sellers along a supply chain providing credence attributes typically ranges between small to medium. This means that price uncertainty is higher and, as a result, transaction costs are higher.

The biggest variance for different credence attributes is the level and type of asset specific investments required. For example, beef products branding product origin require supply chain participants to be located in a specific region. It is most likely that instead of new investors coming into the region, existing operations located in the region will take part in the program and therefore site specific investments will actually be quite low. Investment will only become high if new investors enter a region in order to participate in a program. At the opposite extreme, as animal welfare and environmental preservation program standards become more stringent, the physical improvements required could be quite large and result in high levels of physical asset specificity and, consequently, higher transaction costs. Human asset specific investments also vary between attributes and will result in differences in the transaction costs incurred when producing particular attributes.

Incomplete information on the production of particular attributes can result in transaction uncertainty when experience and search attributes are concerned, which will affect the transaction costs incurred to provide these attributes. The number of buyers and/or sellers for experience and search attributes is often much larger than for credence attributes. As a result, the risk of price uncertainty is lower for experience and search attributes and the transaction costs incurred to reduce the risk of opportunistic behaviour will be lower. Asset specific investments also vary, with investment at the processor level increasing for experience and search attributes such as tenderness, leanness, and convenience. Investment is required into both human capital and physical assets used in the production of these attributes. For credence attributes, investments are often required in the cow-calf or feedlot sectors related to particular production processes.

Shared asset specific investments and other transaction characteristics may help to explain the types of attributes that are commonly grouped together. Although consumers ultimately guide the production of different combinations of attributes, the increase in transaction and operating costs must also be considered. For example, providing a natural grass-fed beef product versus just a grass-fed product does not require much more investment aside from minor alterations to the feed protocol and certification/record keeping systems. Consequently, the marginal increase in costs will be small. For an additional attribute to be produced in combination with other attributes, the marginal cost of producing that attribute must be less than the marginal increase in consumers' willingness to pay. This explains why branded beef programs often bundle several attributes.

Table 6 – Overview of Transaction Characteristics

Attribute	Source Verification /Traceability	Asset Specificity	Information Asymmetry	Price Uncertainty (Quality) ^a	# of Buyers /Sellers	Price Uncertainty (Buyers /Sellers) ^b	Links Required
Natural (C)	Yes	Physical, Human	Yes	No	Medium	Medium	Cow–Calf Operators Feedlots
Organic & GM Free (C)	Yes	Physical, Human	Yes	No	Small	High	Cow–Calf Operators Feedlots
Grass Fed (C)	Yes	Physical, Human	Yes	No	Small	High	Cow–Calf Operators Feedlots
Enhanced Food Safety (C)	Yes	Physical, Human	Yes	No	Small	High	Cow–Calf Operators Feedlots, Processors
Animal Welfare (C)	Yes	Physical, Human	Yes	No	Small	High	Cow–Calf Operators Feedlots, Processors
Environmental Preservation (C)	Yes	Physical, Human, Site	Yes	No	Small	High	Cow–Calf Operators Feedlots, Processors
Source Verification (C)	Yes	Human	Yes	No	Small	High	Cow–Calf Operators Feedlots, Processors
Process Verification (C)	Yes	Human	Yes	No	Small	High	Cow–Calf Operators Feedlots, Processors
Product Origin (C)	Yes	Site, Human	Yes	No	Small	High	Cow–Calf Operators Feedlots
Breed (C)	Yes	Physical, Human	Yes	No	Medium	Medium	Cow–Calf Operators
Tender (E)	Varies	Physical, Human	No	Yes	Large	Low	Cow–Calf Operators Feedlots, Processors
Lean (S)	Varies	Physical, Human	No	Yes	Small	High	Cow–Calf Operators Feedlots
Convenience (S)	No	Physical	No	No	Large*	Low	Processors

a. Price uncertainty arising as a result of variability in quality (e.g. If quality varies, price uncertainty will be present).

b Price uncertainty arising as a result of the number of buyers/sellers (e.g. If the number of buyers/sellers is small, price uncertainty will be high).

3.8 Transaction Characteristics and Supply Chain Structures

As discussed in section 2.2, vertical coordination is a continuum including: spot markets, informal alliances, contracts, formal alliances, and vertical integration. Informal alliances can be further broken down into brand licensing organizations and marketing alliances. Contracts can be broken down into marketing and production contracts. Table 7 summarizes the expected relationship between transaction characteristics and supply chain structures.

The optimal supply chain structure depends on the combination of transaction characteristics when producing a particular attribute. For example, information asymmetry may exist when providing an attribute, but this attribute may also require high levels of asset specificity. This will limit the optimal structure to using production contracts, a formal alliance or vertical integration. Production contracts are unlikely to be used if agreements need to be established between cow-calf producers and other sectors, as negotiation costs will be high due to the large number of small cow-calf producers with which individual agreements would have to be negotiated. Given the high capital costs associated with vertical integration in the beef industry, it is most likely that a formal alliance will be used to produce an attribute characterized by information asymmetry and a high degree of asset specificity.

Price uncertainty associated with quality variability and the number of buyers/sellers does not appear to limit the type of coordination that will occur as much as other transaction characteristics due to the reciprocal nature of interactions between supply chain participants. Buyers need a constant supply of a differentiated product on an ongoing basis to meet their commitments and suppliers also need access to a market that will accept the differentiated product they produce. It is likely that price uncertainty will result in production being coordinated outside the spot market; the outcome will be dependent on the combination of other characteristics. In terms of quality variability, any system that can implement a grid-based pricing initiative will result in improved information transfer and reduced quality variability. At the same time, it is expected that the number of buyers and sellers will be closely linked to the degree of asset specificity. Thus, as asset specificity increases and the number of buyers and sellers decreases, supply chain coordination will increase.

The number of participants that are involved with the production of a particular attribute is also important. In situations where cow-calf producers, feedlots, and packers are all involved they will likely choose an informal or formal alliance structure rather than contracts as feedlots will probably be transacting with many cow-calf producers, resulting in high negotiation costs if contracts must be negotiated with each individual. Contracts are typically limited to coordinating transactions between two parties. When more than two parties are involved in the production of a particular attribute, contracts become complex and negotiation costs increase.

The need for a traceability system to ensure the presence of an attribute does not appear to limit the type of coordination that will occur to any great extent. Traceability systems can vary significantly in terms the types of information being transferred between supply chain segments. It is expected that as more information needs to be transferred along the supply chain, closer coordination will occur to facilitate that information transfer.

Table 7 - Relationship between Transaction Characteristics and Supply Chain Outcomes

Transaction Characteristics	Spot Market	Informal Alliances		Contracts		Formal Alliances	Vertical Integration
		Brand Licensing Organizations	Marketing Alliances	Marketing	Production		
	↑	↑	↑	↑	↑	↑	↑
Overall Transaction Complexity	Low	Low	Low/Medium	Low	Medium/High	High	High
	↑	↑	↑	↑	↑	↑	↑
Asset Specificity	None	Low	Low/Medium	Medium/High	Medium/High	High	High
Information Asymmetry	No	No	No	No	Yes	Yes	Yes
Price Uncertainty (<i>Quality Variability</i>)	No	Yes	Yes	Yes	Yes	Yes	Yes
Price Uncertainty # of Buyers/Sellers	Large Market	Large Market	Market Size Varies	Market Size Varies	Medium/Small Market	Small Market	Small Market
Number of Participants	2	>2	>2	2	2	>2	>2
Traceability System	No	No	Yes	Yes	Yes	Yes	Yes

This section has explored the relationship between transaction cost economics and supply chain coordination in the beef industry. The effect of different beef attributes on transaction characteristics and consequently transaction costs has been an important theme. Currently, data on transaction costs in the beef industry are not available. Therefore a survey was used to identify the impact of different transaction characteristics on a cow-calf producer's decision to become involved in different types of supply chain coordination. The development of the cow-calf producer survey and the key results are discussed in the next section.

4. COW-CALF PRODUCERS: WILLINGNESS TO PARTICIPATE IN ALLIANCES

The previous discussion indicated that significant benefits arise from increased coordination, yet the production and supply chain coordination of differentiated beef products also results in increased transaction costs. As Table 5 showed, cow-calf producers play a critical role in the provision of almost all branded attributes, yet their involvement in branded beef alliances has been sporadic and certainly less consistent than that of feedlots and packers. Why has coordination between the cow-calf sector and the rest of the supply chain been relatively limited? The answer to this question may lie in the transaction characteristics that arise in producing differentiated beef products. In this section, the importance of various features (transaction characteristics) of branded beef programs to cow-calf producers is assessed, and the degree to which these factors affect their decision to participate in programs is evaluated. A stated preference methodology (conjoint analysis) is used to assess cow-calf producer attitudes towards branded beef programs.

4.1 Methodological Design

A survey was developed which presented cow-calf producers with descriptions of branded beef alliances and gauged their willingness to participate in an alliance with those features. Branded beef products/programs are described as a set of characteristics. These transaction characteristics result from the beef attributes produced under different branded programs as discussed above. Cow-calf producers were asked to indicate the extent to which they would be interested in participating in a program with these features. A chief advantage of this approach is that it allows us to decompose preferences for individual program characteristics, and to understand the extent to which cow-calf producers might be willing to trade-off one feature of a program for another. For example, it allows us to examine the trade-off between receiving a premium and the need to make asset specific investments to participate in the program. Conjoint analysis has two additional advantages as a research tool in this situation. First, lack of experience with supply chain coordination and branded programs in the Canadian beef industry means that little if any data is available to allow us to evaluate the response to different programs. Second, this approach allows us to understand the effect of individual features of a program on cow-calf producer willingness to participate.

The first step in designing the survey was to describe branded beef in terms of three or four key characteristics¹¹. Different levels of these characteristics must also be defined

¹¹ The analysis is usually limited to three or four key characteristics to avoid over-complicating the evaluation task for survey respondents.

(e.g. low, medium, high). Hypothetical programs are then described in terms of a combination of different levels of these characteristics, and cow-calf producers are asked to indicate how likely they would be to participate in a program with this set of features. The analysis begins by choosing the set of three or four characteristics of branded beef supply chain alliances that are likely to be important in influencing cow-calf producer participation. Based on the discussion in section 3, four categories of characteristics were used in the analysis: 1) asset specific investments required, 2) price uncertainty associated with quality variability, 3) price uncertainty associated with the number of buyers, 4) premiums received. Each of these characteristics is discussed below.

4.1.1. Asset Specific Investments

Asset specific investments required to participate in a particular program are expected to be an important transaction characteristic due to the increased risk of opportunistic behaviour by buyers. The seller incurs increased information and negotiation costs in order to determine a buyer's reputation and reduce the risk of opportunism. It is expected that when asset specificity is present these costs will impact a cow-calf producer's willingness to participate in a program.

Four different 'levels' of asset specific investments were defined based on what has typically been required of cow-calf producers in existing beef programs: 1) no additional investments, 2) adoption of a specific feed and health protocol, 3) capital expenditures for farm improvement, and 4) implementation of a record/certification system. The risk associated with opportunistic behaviour will vary with each type of investment.

4.1.2 Price Uncertainty – Quality Variability

Price uncertainty associated with quality variability has resulted in an industry shift towards grid-based pricing systems. When cow-calf producers move away from using a live weight pricing system, their short-term information costs can be higher due to the costs involved in searching out information on different quality-based pricing systems and determining a buyer's reputation. At the same time, ongoing information costs should be lower as information is transferred through the pricing system to feedlots and cow-calf producers and they are not required to search out additional quality information. The impact on negotiation costs is indeterminate, as ongoing costs should be lower due to reduced negotiation of individual transactions, but a delay in payment can result in increased costs.

Cow-calf producers' preferences for different pricing systems will help identify the significance of different costs in the short-term and long-term and the degree to which they impact a cow-calf producer's willingness to participate in a particular program. Three different pricing methods were defined: 1) grid-based carcass quality pricing, where price is determined based on the quality of the carcass upon processing, 2) live weight pricing, where price is determined at the time of sale based on their live weight, and 3) a combination of grid-based carcass quality pricing and live weight pricing, where an initial payment for cattle is determined at the time of sale and a final payment is made after processing when the quality of the carcass can be determined. These are the three pricing methods used most commonly in the beef industry.

4.1.3 Price Uncertainty – Number of Buyers

The number of buyers available is also expected to have an effect on the level of transaction costs incurred. As the number of buyers for beef with a particular attribute decreases, price uncertainty and the risk of opportunistic behaviour by buyers is expected to increase. Cow-calf producers will incur increased information and negotiation costs in determining a buyer's reputation to reduce the risk of opportunistic behaviour. Three levels are used for this characteristics: 1) a single buyer is available, 2) a small number of buyers are available, and 3) a large number of buyers are available.

4.1.4 Premiums Received

The fourth characteristic included in the conjoint analysis was the premium paid to the cow-calf producer. This is included to determine the extent to which cow-calf producers will trade off between an increase in the transaction costs that they must incur to produce a particular beef product and the premium they receive upon the sale of their product. If the benefits are greater than the increase in transaction costs, we anticipate that more willingness to participate. Four different premium levels were defined, based on the amount current programs in the beef industry had indicated they were paying to cow-calf producers: 1) no premium, 2) 0-5% premium above current market price, 3) 5-10% premium above current market price, and 4) 10-15% premium above current market price.

4.1.5 Other Potential Characteristics

Several other potential features of beef supply chain programs could influence a cow-calf producer's participation decision, for example, information asymmetry, incomplete information, and transaction frequency. However, it was necessary to limit the analysis to four variables to avoid making the conjoint experiment too complicated. When the number of characteristics included in an experiment increases, the task of trading off between characteristics becomes difficult for respondents and can lead to inconsistent responses and a low response rate.

The risk of information asymmetry is minimal in the early production stages compared with downstream stage where uncertainty may arise over the production methods used by suppliers. This characteristic was unlikely to be important to cow-calf producers. However, they may be required to implement a record/certification system by downstream industry segments that are looking to reduce information asymmetries. This effect was captured within asset specific investments, where one of the options is the implementation of a record/certification system. The issues associated with incomplete information were captured under pricing method, as this characteristic is directly related to price uncertainty arising as a result of quality variability.

Transaction frequency was also excluded. While there is an increasing focus on getting cow-calf producers to provide cattle into programs on a more frequent basis, or to switch from spring to fall calving, this variable was relatively less important than the other four variables. Finally, other benefits received by coordination programs including carcass quality information and market access were not included. Again, they were deemed relatively less important based on the analysis in section 3 and were excluded to limit the overall complexity of the experiment. Future research could consider these factors. Table 8

describes the characteristics and the levels used in the conjoint analysis¹². Details of the model specification are included in the technical appendix.

Table 8 - Characteristics and Characteristic Levels Used in Survey

Characteristics	Characteristic Levels
Asset Specific Investments	No Additional Investment Feed & Health Protocol Record/Certification System Farm Improvement Expenditures
Pricing Method	Carcass Quality Live Weight Live Weight & Carcass Quality
Number of Buyers	Single Buyer Small Number of Buyers Large Number of Buyers
Expected Premium	No Premium 0-5% 5-10% 10-15%

Eighteen program scenarios were created from combinations of these program characteristics. Details of the means by which 18 scenarios were selected is provided in the technical appendix. Survey respondents were asked to indicate whether they would be highly unlikely to highly likely to participate in a branded beef program with these features on a scale from 1-12. An example of a program scenario is presented in Table 9.

Table 9: Example of a Program Scenario

Scenario One											
Investment:		Record/Certification System									
Pricing Method:		Live Weight									
Number of Buyers:		Large Number of Buyers									
Expected Premium:		5-10%									
Highly unlikely to produce						Highly likely to produce					
1	2	3	4	5	6	7	8	9	10	11	12

4.2 Data Collection

Data were collected at the Western Stock Grower's Association (WSGA) Annual meetings held in Saskatoon, Saskatchewan in December 2003. Cow-calf producers were

¹² A copy of the survey can be found in Brocklebank (2004) or is available from the authors on request.

approached during the conference and asked if they would be willing to complete the survey. Seventy-three usable surveys were completed¹³.

In addition to the 18 program scenarios in the conjoint experiment, the survey asked questions regarding the importance of different beef marketing characteristics to cow-calf producers. It also gauged cow-calf producer perceptions on the performance of existing alliances. The last section of the survey gathered socioeconomic data and information on the respondent's beef operation. This information helps to identify whether different types of cow-calf producers exhibited significantly different responses

Relative to the general Canadian farm population, the respondents in this survey tended to have higher gross revenues. Of the 73 respondents, 67% had gross farm revenue above \$100,000, 23% had gross farm revenue above \$250,000 and 13% had gross farm revenue above \$500,000. On average, the sample also had a higher education attainment than the general population of farm operators in Canada. Of the individuals that completed the survey, 29% had a high school education, 51% had a college diploma or a certificate from a technical school, and 10.4% had either an undergraduate or graduate degree. Younger farm operators tended to be over represented, which probably reflects attendance at the stockgrowers meeting. Thirty-five percent of respondents were less than 35, while 62% were between 35 and 60 and 3% were older than 60 years of age. The average herd size of the sample appeared to be larger compared with statistics from the general farm population. Thirty eight percent of respondents had cow herds of less than a 100 head, while 41% had herds of between 100 to 200 head. Approximately 60% of all respondents have other sources of farm income. Forty-eight percent of respondents' backgrounded calves and 15% had a finishing feedlot. Fifteen percent of respondents had participated in some method of further coordination. Participation ranged between the use of contracts and more formal alliances. A table describing the key sample characteristics is included in the technical appendix.

4.3 Survey Results

4.3.1 *Relative Importance of Program Characteristics*

The conjoint analysis calculates 'part-worth values' for each characteristic level. The part-worths tell us the value that survey respondents implicitly placed on that aspect of a branded beef program. It is important to note that respondents did not evaluate each program attribute individually, instead they evaluated whole program profiles. The conjoint procedure allows us to decompose this into an evaluation of each program attribute. Evaluating whole program profiles is more realistic as it more closely mirrors the decision process for a cow-calf producer, (i.e. the producer will base her/her decision on whether to join a program on their evaluation of the whole program, and cannot usually pick and choose individual features of a program). The average part-worth values for the respondents for each program characteristic level are reported in Table 10.

¹³ An attempt to collect data at a beef industry meeting in Alberta in February 2004 was largely unsuccessful due to low participation rates. Timing is largely to blame for this: the US BSE case had only just occurred and the unusual circumstances this created may have deterred participation in the survey as producers were focused on other issues.

Table 10 - Aggregate Part-Worth Values for Each Characteristic Level

Characteristic Level	Part-worth Value
Constant	5.9977
Expected Premium	
No Premium	-2.3887
0%-5%	-0.8853
5%-10%	1.3031
10%-15%	1.9709
Asset Specific Investments	
Farm Improvements	-0.7825
Record/Certification System	0.1421
Feed & Health Protocol	0.1798
No Asset Specific Investment	0.4606
Number of Buyers	
Single Buyer	-0.5936
Small Number of Buyers	-0.1878
Large Number of Buyers	0.7814
Pricing Method	
Carcass Quality	-0.3630
Live Weight	0.1678
Carcass Quality & Live Weight	0.1952

The table shows that higher premiums were associated with higher part-worth values (i.e. generated more value for respondents), as was expected. When cow-calf producers are required to incur capital expenditures for farm improvement, the value¹⁴ they derive from participation in a program is reduced to larger extent than when they are required to invest in a specific feed and health protocol, a record/certification system, or not required to make any investments. The results suggest that cow-calf producers are in fact willing to make investments into specific assets in order to participate and that opportunistic behaviour is not always a concern, but as the degree of investments required increases, willingness of cow-calf producers to participate decreases.

The part-worth values for the number of buyers reveal that the cow-calf producers value having a large number of buyers available in the market. We anticipate this is because it reduces the risk of opportunistic behaviour and the associated transaction costs. At the same time most supply chain coordination programs that produce differentiated beef products sell into a market with fewer buyers. The relative importance of this attribute is smaller and the part-worth values are lower, thus it is likely that cow-calf producers will be more willing to accept a smaller number of buyers if other aspects of the program are favourable.

¹⁴ Value in this context is also known as 'utility', which is a measure of the benefit an individual receives. In the conjoint analysis, the total utility (value) of a scenario is the sum of the part-worth utilities (values).

Pricing method used is also of less relative importance to cow-calf producers indicating that there is relatively less concern over uncertainty associated with price compared to the other attributes. As a result, the transaction costs associated with this are likely to be lower than for other characteristics. The part-worth values in Table 10 indicate that cow-calf producers prefer a combination live weight and carcass quality pricing over the other two pricing methods. A pricing method based on carcass quality grades alone was less desirable than a live-weight pricing method. The preferences toward a quality based pricing method provide some insights into transaction costs. The potential long term reduction in ongoing information costs with a quality based pricing system may be greater than the short-term search costs. Similarly, the negotiation costs associated with a delay in payment that usually characterizes quality based pricing system may be offset by reduced need for negotiations over the long term.

The average part-worth values for each characteristic level can be used to calculate the relative importance of each characteristic, as displayed in Figure 1¹⁵. The expected premium emerged as the most important program characteristic (42%). Investments in specialized assets were the second most important program characteristic (24%). Number of buyers was third in relative importance at 18% and pricing method was fourth at 16%.

These results help explain the value placed on different transaction characteristics by cow-calf producers. While pricing method was relatively less important, the premiums expected and investments required in specific assets both have an important impact on cow-calf producers' preferences for different supply chain coordination programs.

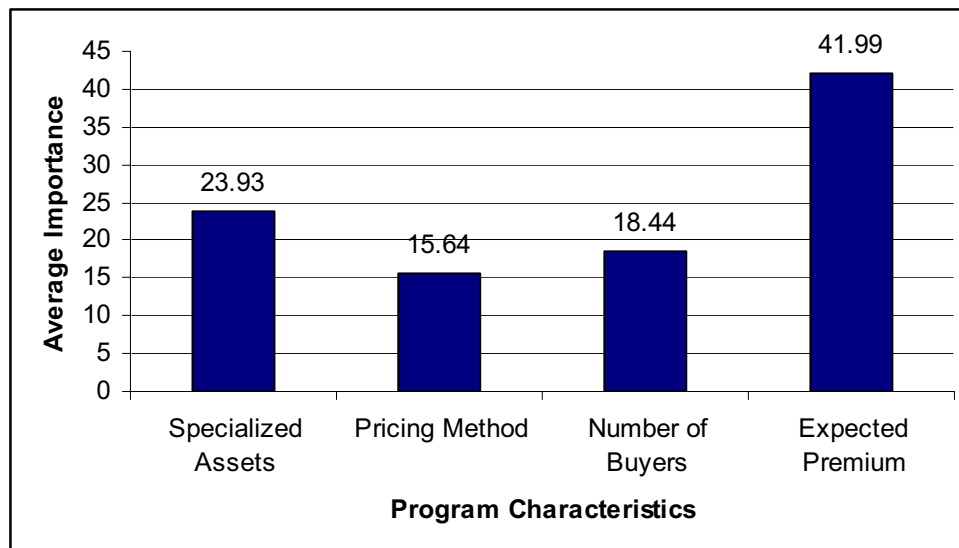


Figure1 – Relative Importance of Program Characteristics (n=73)

¹⁵ Relative importance scores are calculated by taking the range of part-worth estimates for a particular characteristic and dividing it by the sum of all the part-worth ranges for all the attributes (SPSS, 1997). Thus, the wider the range of part-worth values for a particular program characteristic, the larger the impact this had on producers' choices between the program scenarios.

4.3.2 Trade-offs between Transaction Characteristics

The estimated part-worth values in Table 10 are a powerful tool that enables us to reconstruct how cow-calf producers would have responded to any combination of the program characteristics. Thus, by summing the constant and the part-worth coefficients for the relevant characteristics from Table 10, we can calculate the overall value (utility) that any program would have generated. In this way, we can compare the trade-offs that producers were implicitly making among the program characteristics.

Consider Table 11. Although expected premiums emerged as the most important characteristic on average influencing cow-calf producers choices among the program scenarios, the comparison in this table shows that scenario II is preferred to scenario I despite the fact that the expected premium is higher in scenario I. Therefore, in this hypothetical program, the price premium is not enough to offset the increased transaction costs from a reduced number of buyers and a change in payment method.

Table 11: Increased Transaction Costs Outweigh a Price Premium

Characteristic	Scenario I	Part-worths	Scenario II	Part-worths
Expected Premium	<i>10 - 15% premium</i>	1.9709	<i>5-10% premium</i>	1.3031
Asset specific investments required	<i>Record/certification system</i>	0.1421	<i>Record/certification system</i>	0.1421
Number of buyers	<i>Single buyer</i>	-0.5936	<i>Large number of buyers</i>	0.7814
Pricing method	<i>Carcass quality</i>	-0.3630	<i>Live weight</i>	0.1678
Constant		5.9977		5.9977
Total value (utility)		= 7.1541		= 8.3921

We can also compare the trade-off between two program characteristics. Table 12 allows us to compare the extent to which cow-calf producers were willing to trade-off having to make an asset specific investment in farm improvement expenditures versus receiving a larger price premium. The two hypothetical programs described in Table 12 both have access to a single buyer and use a combined carcass quality and live weight pricing method. However, in Scenario A price premiums are between 5 and 10 percent and no investment by the producer is required, while in Scenario B premiums range between 10 and 15 percent but cow-calf producers are required to make farm improvement expenditures. When utility is calculated for the two scenarios it is apparent that the preference for a lower level of investment is traded-off against the decrease in premiums. Cow-calf producers are willing to accept a lower level of premiums in exchange for the lower level of investment provided in Scenario A. Therefore, scenario A is preferred to B.

Table 12 Trade-off between Farm Improvement Expenditures and 5-10% Price Premiums

	Scenario A	Scenario B
Expected Premium	1.3031 (5%-10%)	1.9709 (10-15%)
Investments	0.4604 (None)	-0.7825(Farm Impr.)
Number of Buyers	-0.5936 (Single)	-0.5936 (Single)
Pricing Method	0.1952 (CQ & LW)	0.1952 (CQ & LW)
Constant	5.9977	5.9977
Total Value (Utility)	7.3628	6.7877

There are limitations in the willingness of cow-calf producers to participate in programs when certain trade-offs are required. For example, Scenario B from Table 12 is compared with a new hypothetical scenario (Scenario C) that requires no investments but has an expected premium between 0 and 5 percent (see Table 13). This time, the utility in Scenario B is greater than that in C, even though cow-calf producers are required to make farm improvement expenditures. In this situation, the reduction in expected premiums outweighed the benefit from avoiding farm improvement expenditures. Clearly, the willingness to participate in different programs will be sensitive to the level of expected premiums.

Table 13 Trade-off between Farm Improvement Expenditures and 0-5% Price Premiums

	Scenario B	Scenario C
Expected Premium	1.9709 (10%-15%)	-0.8853 (0%-5%)
Investments	-0.7825 (Farm Impr.)	0.4604 (None)
Number of Buyers	-0.5936 (Single)	-0.5936 (Single)
Pricing Method	0.1952 (CQ & LW)	0.1952 (CQ & LW)
Constant	5.9977	5.9977
Total Value (Utility)	6.7877	5.1744

Other trade-off comparisons are insightful. For example, we can compare two scenarios that both have access to a small number of buyers and use a grid-based carcass quality pricing system. However, suppose one of the programs requires investments in feed and health protocols and has a 5-10% premium, while the other program requires investments in record/certification systems and has a 10-15% premium. The estimated total utility (value) of these programs would be 6.9198 for the program with the feed/health

protocol and the lower price premium, compared with 7.5599 for the other program¹⁶. Thus, the increased transaction costs from the change in required investments is more than offset by the higher premium. However, if we compare these scenarios with one in which capital expenditures for farm improvements are necessary, the expected premium is 10%-15%, a small number of buyers is present, and they are paid using a grid-based carcass quality pricing system, the total utility would be 6.6353¹⁷. It is apparent that the benefit from higher premiums is now offset by the different required program investments: cow-calf producers are clearly wary of having to make farm improvement expenditures in order to participate in a branded beef program. These expenditures appear to represent higher levels of asset specificity and leave the producers more vulnerable to opportunistic behaviour by buyers.

In general, it appears that cow-calf producers are willing to accept higher investment requirements, smaller number of buyers, and a move towards a quality-based pricing system, but only within a limited premium range. At lower premium levels cow-calf producers' elasticity of supply will be greater and their willingness to participate in programs will be lower than it would be with higher premium levels. They become increasingly responsive to small changes in program requirements at lower premium levels.

The results suggest that the transaction costs resulting from asset specificity are larger than those incurred as a result of the other two transaction characteristics. Consequently, the investments required by a program will have a greater bearing on a cow-calf producer's decision to participate in a particular program.

The effect of a change in premium on the total value of a program to cow-calf producers is interesting. If the premium is reduced from 10%-15% to 5%-10% value (utility) is reduced by 0.6678, but if premium is reduced from 5%-10% to 0%-5% value declines by 2.1884 showing that cow-calf producers become much more responsive to a change in premium as at lower levels.

Similarly, when cow-calf producers are required to implement a record/certification system or a feed and health protocol, their utility remains relatively constant and only declines a small amount from the scenario where no investment is required. On the other hand, they are very responsive to the need to make farm improvement expenditures. For this attribute, the decline in utility from the scenario where no investment is required is much larger, at 1.2431. This may be a result of perceptions regarding the amount of human and capital resources required for each of the investments included in the analysis.

Cow-calf producers are also responsive to a decline in the number of buyers, with utility declining by 0.9692 when the number of buyers moves from large to small and less responsive as the number of buyers moves from being small to a single buyer. This suggests that the perceived risks of opportunistic behaviour are somewhat asymmetric. There is relatively little difference in a small versus single buyer in terms of the risk of opportunistic behaviour, whereas a large number of buyers significantly reduces that risk.

Moving to a pricing method based solely on carcass quality had a larger impact on cow-calf producer choices than the other two payment methods. While they are willing to

¹⁶ This can be seen by adding the relevant part-worth coefficients for each program. 5-10% premium, feed & health protocol, small number of buyers & carcass quality pricing method = $[1.3031 + 0.1798 + (-0.1978) + (-0.3630) + 5.9977 = 6.9198]$. Compared to: 10-15% premium, record/certification system, small number buyers & carcass quality pricing method: $[1.9709 + 0.1421 + (-0.1887) + (-0.3630) + 5.9977 = 7.5599]$.

¹⁷ $= 1.9709 + (-0.7825) + (-0.1878) + (-0.3630) + 5.9977$.

accept some risk that they will receive discounts due to variations in the quality of cattle they produce, many producers are reluctant to accept a price that is completely dependent on carcass quality. Consequently, the decline in relative utility is larger when programs use a pricing system that relies strictly on carcass quality.

Understanding cow-calf producers' preferences for particular program features and the trade-offs that they are willing to make between different features is critically important when evaluating opportunities for the creation and expansion of branded beef value-chain alliances. The results reported in this section provide some initial insights into the degree to which different transaction characteristics affect willingness to participate.

4.4 Additional Insights

4.4.1 Perceptions of Alliances

In a separate survey question, cow-calf producers were asked to rate the importance of four marketing characteristics. On average, receiving a premium price for their animals and detailed data about the quality of animals they sold were regarded as important. Relatively less importance was placed on having a secure buyer and locking in a price for animals a considerable time before they are sold. They were also asked to indicate how they felt a branded beef alliance would perform in this regard. In general, the responses reveal a perception that alliances are a good method for securing a buyer for cattle, obtaining a premium price, locking in a certain price, and obtaining carcass quality information back on the cattle sold.

4.4.2 Perceived Market Size

The survey also explored what cow-calf producers think are the beef attributes most in demand by consumers: they were asked to rate branded beef attributes in terms of whether they thought the consumer demand for the attribute was likely to be large, medium, or small. It is interesting to see if their perceptions corresponded with the estimated market sizes in section 3. Figure 2 compares the survey responses with the rough estimates of market size made in section 3. There may be conceptual differences among individuals in terms of what they perceive as small, medium or large market potential, nevertheless with this caveat in mind, the comparison still provides useful insights. Respondents recognize the large demand for both tender and convenient products. They also are aware of the emerging market for natural and breed-oriented products. With the exception of grass-fed products, the cow-calf producers appear to overestimate the market size for other attributes such as leanness, product origin, and organic.

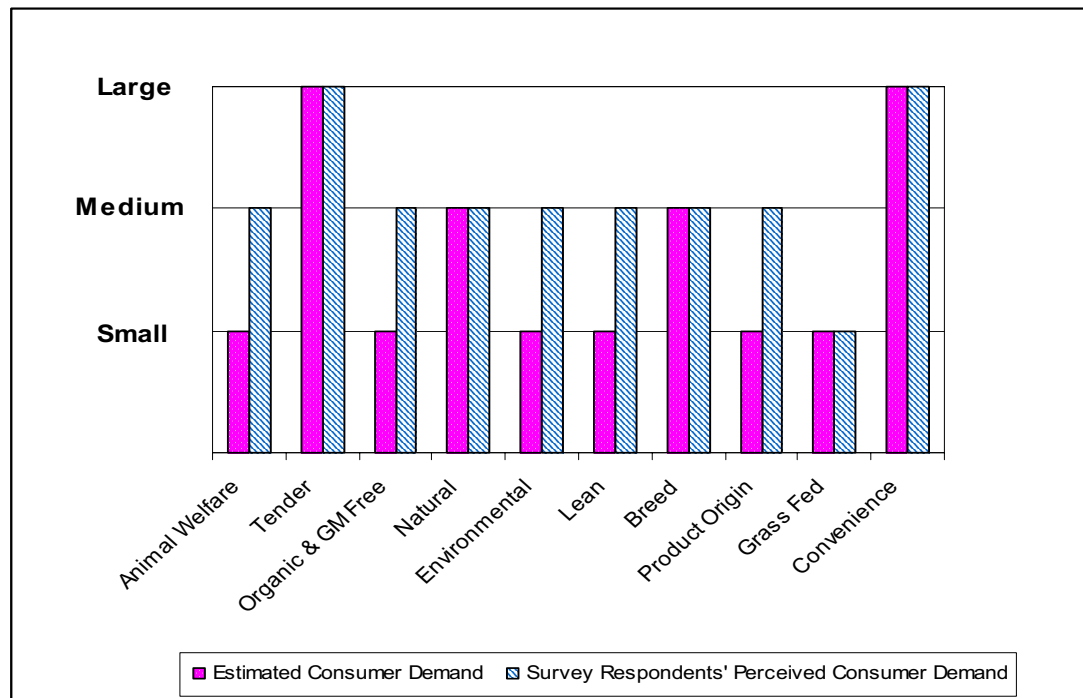


Figure 2 - Estimated and Perceived Market Size for Branded Beef Attributes

4.4.3 Membership Fees

Membership fees are quite common among branded beef programs, although the structure of these fees is quite diverse. Two main fee structures are apparent. Some programs require a one-time entrance fee and a yearly fee per animal marketed through the program. Other programs just require a fee per animal. Typically one-time entrance fees are in place to ensure a participant's commitment to the program, while yearly per animal fees cover program administration and management costs. Different membership fee scenarios and values could have been analyzed through the conjoint experiment, but were not included to avoid over-complicating the choice task for survey respondents. Instead, the survey explored the effect of different fee structures on willingness to participate in a program through a separate question. Respondents were presented with three different program descriptions that varied in terms of the fees, and were asked to select the minimum premium that they would be willing to accept in order to enter the program.

Scenario A consisted of a one-time fee of \$15,000 and then a yearly per head fee of \$5. Scenario B involved a one-time entry fee of \$2,500 and then a yearly per head fee of \$5. Scenario C did not have a one-time entrance fee, but there was a yearly per head fee of \$5. The fees were based on fees charged within existing programs. The choice of premiums ranged from 0-5% to 15-20% and was based on premiums reportedly available in existing alliances.

Figure 3 illustrates the premiums that respondents would require to participate in each of the program scenarios. When one-time fees are quite high, as in Scenario A, 83% of respondents required a premium of at least 10% above current market price and 49% required premiums to be 15% to 20% above current market price in order to participate. In Scenario B, where there was a lower one-time fee, 80% of respondents required a premium

in the range of 5% to 15% in order to participate and 44% expected a premium between 5% and 10% in order to participate. In Scenario C, where no one-time fee is charged, 82% of respondents were willing to accept a premium of less than 10% in order to participate and 48% of respondents were willing to accept a premium that ranged between 5% and 10% to participate.

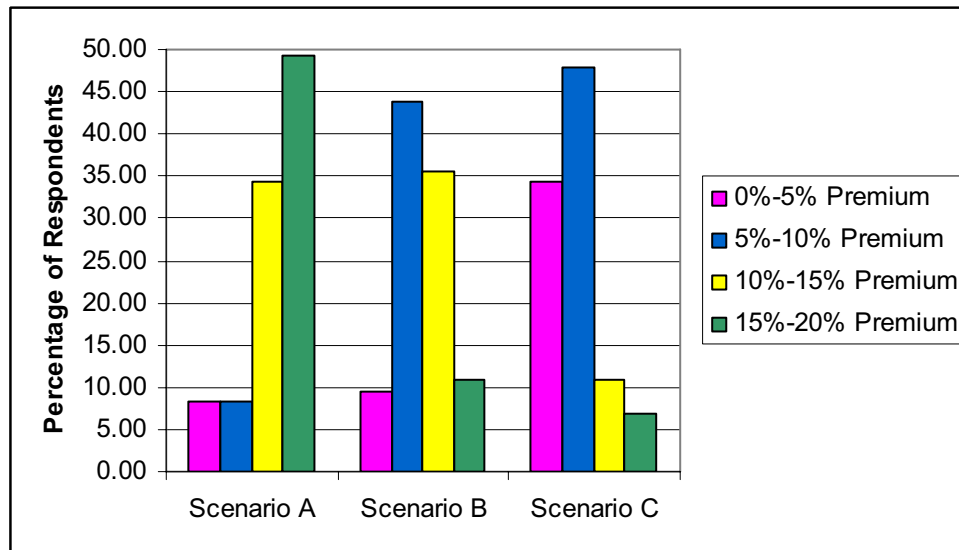


Figure 3 - Willingness to Participate in Programs Based on Membership Fees

There is a subtle relationship between the effect of fees on willingness to participate and the investment in specific assets. When cow-calf producers pay fees they are committing capital to a program. From the perspective of the program, higher fees ensure a cow-calf producer's longer-term commitment to the program as they now have a vested interest in its success. At the same time, if the producer has also made asset specific investments in farm improvements, new record-keeping system or feeding protocols, he/she may be less willing to make this additional capital outlay due to the increased risk of opportunistic behaviour. The requirement to make a long-term commitment to a program locks the producer into a specific supply relationship, with fewer buyers and increased costs associated with transferring out of the program. Therefore, in order to pay the program fees, the benefits associated with entering into program must more than offset the transaction costs arising from the increased commitment.

4.5 Implications

When beef industry participants are developing programs to improve coordination and produce different beef attributes, cow-calf producer attitudes need to be kept in mind. Cow-calf producers can affect the quality and consistency of different branded beef attributes, whether it is through the genetics they use, their production protocols, or the management systems in place. Currently, coordination between this sector and other segments of the supply chain is not occurring to any significant scale. As a result, information and incentives are not being transferred to cow-calf producers to improve coordination and provide consumers with the products they demand on a consistent basis

To improve coordination between cow-calf producers and other supply chain participants, programs need to work with producers and consider the trade-offs they make between program characteristics. The value that producers place on reduced transaction costs and premiums has to be greater than the increase in transaction costs. This analysis has provided some insights into the trade-offs cow-calf producers are willing to make.

Other factors may also be important. Operation and management characteristics at the cow-calf producer level may also affect program participation. There are significant challenges associated with individual cow-calf producer size and industry concentration that are not present to the same extent at other levels of the industry. These issues are explored in the next section, which also discusses the types of supply chain coordination programs emerging within the beef industry and the challenges, limitations, and opportunities associated with these different programs.

5. EXISTING ALLIANCES: LESSONS LEARNED

5.1 Introduction

This section provides in-depth case study analyses based on interviews with key managers and directors of beef value chain alliances in Canada and the U.S. The information obtained from these interviews is used to identify the critical success factors and challenges to improving coordination in the Canadian beef industry. The ways in which these alliances have overcome the potential barriers to cow-calf producer participation discussed in section 4 are examined. The discussion begins with an overview of the alliances interviewed. Insights from these alliances on the importance of the different transaction characteristics outlined in section 3 are discussed. Following this, a succinct discussion of additional characteristics that have an impact on improving supply chain coordination is discussed. The section concludes with a discussion of the opportunities that exist to improve coordination and reduce the costs incurred by supply chain participants.

The high levels of concentration in the feedlot and packing sectors in both Canada and the U.S., and the relatively small number of alliances, preclude the use of a survey as the basis of a quantitative stated preference analysis. Instead, in-depth interviews were conducted with seventeen individuals who were either managers or directors of an existing alliance or involved in developing and managing information technology for the beef industry. The companies interviewed are located in Kansas, Nebraska, Missouri, Saskatchewan, and Alberta. The three U.S. states were selected because they have some of the largest breeding herds and feeding areas in the U.S. Alberta is Canada's largest beef producing province. Ten interviews were completed in the U.S. and seven in Canada. The interviews were conducted in February and March 2004¹⁸.

¹⁸ It is acknowledged that the interviews were limited to a relatively small geographical area given the dispersion of the beef industry throughout Canada and the U.S., however, both time and resource constraints precluded a more extensive interview process. The relatively small number of value chain alliances within the Canadian beef industry limited the number of Canadian interviews that could be conducted. Unfortunately, it also proved difficult to get the cooperation of Canadian industry members. This may be a result of a somewhat shorter term focus in the wake of BSE and perhaps less experience with alliances in Canada.

The interviews were conducted in person and took approximately one hour. An outline of interview questions was developed in order to guide the discussion¹⁹. The interview focused on the organizational characteristics of the alliance and structure of the program and/or company. Questions were also asked about the pricing method used, average premiums, additional benefits received, and other issues surrounding pricing structure and market access. In the last part of the interview, interviewees were queried regarding the current limitations and barriers their alliances had faced, expected growth, and the value of standardized traceability systems. Table 14 provides a list of the organizations interviewed, their location, and approximate size of alliances in terms of the number of animals marketed through each program per year.

Table 14 - Organizations Interviewed

Organizations	Location	Size (# animals/year)
PM Beef Group	United States	65,000 ²⁰
Heartland Premium Beef Alliance	United States	35,000
Cow Camp Beef Alliance	United States	1,500
GeneNet	United States	100,000
Nebraska Corn Fed Beef	United States	40,000
Laura's Lean Beef	United States	85,000
Ward Feed Yard/ILS	United States	90,000
Beef Marketing Group	United States	450,000
Decatur Beef Alliance	United States	50,000
U.S. Premium Beef	United States	692,000
Highland Premium Alberta Beef Alliance	Canada	2,000
Tee Creek Premium Meats	Canada	300
Ranchers Renaissance	Canada/United States	260,000
Excel Meats/Cargill	Canada/United States	Not specified
Sunterra Farms	Canada	Not specified
Ranchers' Beef	Canada	Not specified
XL Foods Inc.	Canada	Not specified
ComputerAid Professional Services Ltd.	Canada	N/A
Viewtrak Technologies Inc.	Canada	N/A

Rather than discuss each interview separately, the following sections present a synthesis of the information obtained from all of the interviews. In each section, the observations made and conclusions drawn are based upon multiple interviews.

¹⁹ The interview guide can be found in Brocklebank (2004) or is available on request from the authors.

²⁰ Process approximately 200,000 head annually, with 65,000 being processed through their Ranch to Retail process/source verified system.

5.2 Overview of the Alliances

5.2.1 Program Structures

Tables 15 and 16 provide a synopsis of the different program structures, requirements, and benefits. The programs listed in the tables are limited to those that can be classified as being either an informal or formal alliance; as such, Excel Meats, XL Foods Inc., and Ranchers' Beef were excluded. Ranchers' Beef is in an industry initiative to develop a mid-size producer owned processing plant in Alberta and is currently in the development stages. The interviews with Excel Meats and XL Foods did not provide sufficient information to provide a meaningful comparison with the other alliances.

The alliances varied significantly, ranging from very informal and loosely coordinated alliances to very formal and highly integrated arrangements. The volume of cattle marketed annually through each alliance ranges from 300 to over 650,000 head. Alliances also varied in terms of who was driving the alliance and its ownership structure. The sector of the industry that drives an alliance appears to be important in determining its organizational and ownership structure.

Referring to Table 15, cow-calf producer-driven alliances appear to be more formal and have often been structured as cooperatives where ownership is shared between the individuals involved in the program; an example is U.S. Premium Beef. When feedlots or packers have developed alliances they are typically privately driven ventures that are more informal in their coordination of the supply chain. An example of a packer driven program is PM Beef Group, while Decatur Beef Alliance is an example of a feedlot driven program. Other alliances have been initiated by external entities and have taken two different forms. Companies have emerged that facilitate coordination, as a service to different industry segments, without the company actually owning any facilities, livestock, or end-products. GeneNet is an example. It provides a service to producers, feedlots, and the packer with which it is aligned. Other external companies have emerged that also facilitate the coordination of different parts of the industry. These companies purchase finished products and manage the marketing of these products to retailers and other end users; examples include Laura's Lean Beef (LLB) and Nebraska Corn Fed Beef (NCFB).

The attributes being branded mainly entail high quality beef products that are tender, flavourful, and of a consistent quality. Laura's Lean Beef (LLB), Highland Premium Alberta Beef (HPAB), and Tee Creek Premium Meats (TCPM) produce natural beef products that are hormone and antibiotic free. The production of lean meat is also emphasized by LLB, while HPAB brands its product as being produced in Alberta. NCFB is differentiated as being produced in Nebraska and corn-fed. Heartland Premium Beef (HPB) produces Holstein cattle derived from the calves from dairy farms and focuses strictly on this breed. Also unique is the Beef Marketing Group (BMG), which was developed by a group of feedlots in order to guarantee the processor, IBP, with a supply of product into a specific plant. While members of the group are focused on high quality production, the arrangement is not directly driven by the production of particular attributes. Instead, benefits are derived from guaranteeing the supply of a large volume of cattle to a nearby processor; it is an assured market that primarily drives this alliance.

Table 15 – Key Features of the Alliances Interviewed

Alliance	Initiating Party/ Ownership	Packer/End User Involvement	Attributes	Branded Program	Commitment	Fees	Pricing Method
PM Beef Group (U.S)	Packer Private Company	- PM Beef - 2 mid-size retailers	High Quality Process-verified	Retail Brand Labels	Annual Contract Per Head Fee	\$3/head	Quality Grid (Futures) + \$3/cwt (live)
Heartland Premium Beef (U.S)	External (Service) Private Company	- IBP - Smithfield Foods - No retailer	Holstein High Quality	No	Verbal		Base Price + % of Profits
Cow Camp Beef Alliance (U.S)	Feedlot Private Company	- US Premium Beef - IBP - No retailer	High Quality	No	Verbal	↑ Custom Charges & Lease USPB Shares	IBP Grid or USPB Grid
GeneNet (U.S)	External (Service) Private Company	- Swift & Co. - No retailer	Different Breeds High Quality	No	Per Head Fee Verbal	\$3 to \$7 per head based on data type	Quality Grid
Nebraska Corn Fed Beef (NCFB) (U.S)	External (Markets EndProduct) Non-profit Licensing Org	- Swift & Co. - 1 mid-size retailer & other end-users	High Quality Nebraska Corn Fed	Nebraska Corn Fed Beef	Per Head Fee Verbal	\$3 to \$4 per head & \$1 tag fee	Swift & Co. Quality Grid Or Cash Market

Table 15 – Continued

Alliance	Initiating Party/ Ownership	Packer/End User Involvement	Attributes	Branded Program	Commitment	Fees	Pricing Method
Laura's Lean Beef (LLB) (U.S)	External (Markets EndProduct) Private Company	- Multiple packers - Multiple large & mid-size retailers	High Quality Lean Natural	Laura's Lean Beef	Annual Contract		Lean/Quality Focused Grid
Ward Feed Yard/ ILS (U.S)	Feedlot Private Company	- IBP - Other packers - No retailer	High Quality	No	Annual Feeding Agreement	Fees to use different services	Packer Grids Or Cash Market
Beef Marketing Group (U.S)	Group of Feedlots (Closed)	- IBP (excl. agrmt.) - No specific retailer	High Quality Volume	No	No Producers Feedlots own shares	None	Exclusive Deal: IBP Grid or Bid
Decatur Beef Alliance (U.S)	Feedlot Private Company	- Excel - No specific retailer	High Quality	No	Annual Contract Per Head Fee	\$5/head + \$0.02/head/day on feed	Quality Grid
U.S. Premium Beef (U.S)	Producer Cooperative (Closed)	- National Beef (USPB majority owner) - Supplies several large retailers	High Quality	Nat'l Beef Brand Programs	Buy/Lease Shares (Cost is \$138/share/animal) Lease rate varies	Member Fee: Life-time \$500 Annual \$100	Quality Grid

Table 15– Continued

Alliance	Initiating Party/ Ownership	Packer/End User Involvement	Attributes	Branded Program	Commitment	Fees	Pricing Method
Highland Premium Alberta Beef Alliance (Cdn)	Feedlot Private Company	- XL Foods (Natural) - Cargill (Non-natural) - 1 mid-size retailer - 1 internet based co.	High Quality Natural Alberta Origin	Highland Premium Alberta Beef, Blue LabelBeef	Annual Feeding Agreement Per Head Fees	\$5/head	Live-weight Pricing System (Natural) Quality Grid (Non-natural)
Tee Creek Premium Meats (Cdn)	Producers Private Company	- Custom processed @ Northwest Foods - 1 small retailer	High Quality Natural	Tee Creek Premium Beef	Participants are all shareholders in the company	None	Live-weight Pricing System
Ranchers Renaissance (U.S)	Producer Cooperative (Closed)	- Excel - Multiple large retailers	High Quality	Retail Brand Labels	Membership Fee Between \$2,500 and \$25,000 (Class A & B members)	\$3/head	Price based off of boxed beef price

Table 16 – Summary of Program Requirements and Benefits from Participation in Alliances

Alliance	Program Requirements				Average Premiums	Other Benefits
	# of Head	Ownership	Protocols/ Certification	Traceability		
PM Beef Group (U.S)	40	- Sell Calves - Partner w/Feedlot - Retain ownership	- Feed Protocol - Health Protocol - Certified Feedlots - USDA Verified	- Animal Passports - Electronic identification	\$40-\$60 per head	- Ind. Carcass Data
Heartland Premium Beef (U.S)	Not specified	- Retain ownership	- Feed Protocol - Health Protocol	- Electronic identification	↓ Discount in beef market	
Cow Camp Beef Alliance (U.S)	50	- Retain ownership - Partner w/Feedlot	- No Specific Protocols	- Electronic identification	Grid Premiums	- Ind. Carcass Data (USPB) - Group Carcass Data (IBP)
GeneNet (U.S)	40	- Sell Calves - Partner w/Feedlot - Retain ownership	- No Specific Protocols	Optional: - Tags - Electronic identification	\$20 -\$40 per head	- Ind. Or Group Carcass Data - Cost of Data Varies

Table 16 – Continued

Alliance	Program Requirements				Average Premiums	Other Benefits
	# of Head	Ownership	Protocols	Certification		
Nebraska Corn Fed Beef (NCFB) (U.S)	40	- Sell Calves - Partner w/Feedlot - Retain ownership	- Produced in Nebraska - Feed Protocol - Health Protocol - Beef Quality Assurance Certification - Affidavits & Internal Audits	- Required to keep records	Slotting Premiums: \$1-\$3/cwt + Grid Premiums	- Group Carcass Data
Laura's Lean Beef (LLB) (U.S)	No Minimum	- Sell Calves - Retain ownership	- Exotic Breeds - Feed Protocol - Health Protocol - Affidavits & Internal Audits - USDA Cert.	- Program specific tags	Cow/Calf Bonus Fdlt Bonus Grid Premiums	- Ind. Carcass Data
Ward Feed Yard/ILS (U.S)	Not specified	- Sell Calves - Retain ownership	- No Specific Protocols		\$5-\$20 per head	- Ind. Or Group Carcass Data
Beef Marketing Group (U.S)	N/A	N/A	- No Specific Protocols		IBP Price Premiums	- Ind. Or Group Carcass Data
Decatur Beef Alliance (U.S)	60 (same sex)	- Sell Calves - Retain ownership	- No Specific Protocols - Scanning Tech.	- Electronic identification	\$30-\$50 per head	- Ind. Carcass Data

Table 16 – Continued

Alliance	Program Requirements				Average Premiums	Other Benefits
	# of Head	Ownership	Protocols	Certification		
U.S. Premium Beef (U.S)	100	- Retain ownership - Lease shares	- No Specific Protocols - Qualified Custom Feedlots	- Electronic identification - Tags	\$16-\$46 per head	- Ind. Carcass Data - Dividends (% of profits) - ↑ in share value
Highland Premium Alberta Beef Alliance (Cdn)	35	- Sell Calves - Partner w/Feedlot - Retain ownership	- Feed Protocol - Health Protocol - Certification	- Tags	15% above live weight market price	- Ind. Carcass Data
Tee Creek Premium Meats (Cdn)	Not specified	- Retain ownership	- Feed Protocol - Health Protocol - Internal Cert. - Working w/CFIA to obtain cert.	- Tags - Individual monitoring	No Prem. currently paid	↑ in value of company
Ranchers Renaissance (U.S)	Classes: A- 150 B- 2,000	- Retain ownership	- Feed Protocol - Health Protocol - HACCP system - Internal Certification	- Electronic identification	\$27-\$52 per head	- Ind. Carcass Data

All of the individuals interviewed indicated that the involvement of a packer was critical to the success of their alliance. Accordingly, they were aligned or driven by a specific packer. In a couple of cases, alliances marketed beef through two or more different processors. An example is the Cow Camp Beef Alliance, which markets beef through National Beef and IBP. Critical to alliances with a retailer is which party owns the brand name label(s). Interestingly, seven of the thirteen programs listed in Table 16 are not linked to a particular branded beef program and, instead, direct their production into multiple commodity and brand programs that are owned by a processor. Processors typically market their brands through major retailers and distributors throughout North America. Four of the alliances own a brand name label and are aligned with specific retailers. Two programs focus on supplying products to specific retailer private labels. The ownership structure for a brand name label can affect the relationship between supply chain participants within an alliance and also how they are linked to end-users. This is discussed further in section 5.3.

5.2.2 Coordination of Production

Pricing Method

Many of the alliances actively seek to operate outside the traditional commodity market that uses a live-weight pricing system based on average lot quality. There is frustration that they are not rewarded for the production of high quality cattle in this system. Consequently, these cow-calf producers and feedlots support the use of a grid-based pricing system, which is used by a majority of the alliances interviewed with the exception of two of the natural programs (Highland Premium Alberta Beef Alliance and Tee Creek Premium Meats) in Canada. These programs currently have fairly small volumes.

The structure of the grid-based pricing systems varies in terms of the number and types of measurements used to determine overall carcass quality. Some grid pricing systems are exclusive and only available to cattle marketed through a specific alliance to a certain packer. In other cases, the processor's pricing grid is available both to individuals within the alliance and to those who are simply marketing cattle to that processor.

All of the individuals interviewed stated that their grid-based pricing systems changed on an ongoing basis, with adjustments to make the system more responsive to consumer demands. As more quality-based grids have emerged, processors have had to remain competitive and increase the premiums paid to producers in order to procure adequate volumes of cattle with particular attributes. Processors have an incentive to ensure that their pricing grids are competitive, as individuals have increasing opportunities to switch to other programs. Those that do not remain competitive will not be able to procure adequate volumes of high quality cattle for their own branded programs and will incur increased search costs to procure these cattle through the cash market.

Program Requirements

A cow-calf producer or feedlot is typically required to have at least 40 head to enter into a program, as these cattle are often segregated through the production process. This helps maintain an efficient lot size. New identification technologies have facilitated the tracking of cattle in mixed ownership lots, but have not yet been adopted on a widespread scale. The requirement also ensures transportation costs are minimized and economies of scale are captured (40 head roughly corresponds with one truck-load). Some of the alliances require larger volumes of cattle to ensure adequate volumes of production flow into their branded beef programs. As Table 16 shows, U.S. Premium Beef requires an

annual minimum of 100 head of cattle and Ranchers Renaissance has a minimum requirement of 150 head.

There were significant differences in terms of the production protocols that participants in the alliances were required to follow. From Table 16 it is clear that the natural-based programs, such as Laura's Lean Beef and Highland Premium Alberta Beef, all have specific feed and health protocols for producers and feedlots. The quality-based programs vary in terms of the protocols. Ranchers Renaissance has quite detailed production and processing protocols that have been implemented to ensure consistent and high quality production. Others alliances, such as Decatur Beef Alliance, rely on the use of economic signals to direct production and have very few, if any, production requirements. Programs also differ because of the attributes being branded and variously require cattle to be of a certain origin, or breed, etc. For example, Heartland Premium Beef Alliance marketed Holstein cattle, and cattle marketed through Nebraska Corn Fed Beef must be produced within Nebraska.

Traceability and Certification Systems

The implementation of traceability and certification systems also varies among alliances. Several of the alliances have adopted electronic identification systems to facilitate the tracking of individual animals throughout production and processing. These systems are often tied directly to the provision of carcass quality data that can be applied to specific animals rather than an overall lot basis. The natural programs examined had third party certification from either the Canadian Food Inspection Agency or the U.S. Department of Agriculture (USDA). While several of the quality-based programs have internal certification programs and require participants to sign affidavits, PM Beef is unique in that its system is USDA Process Verified. This is a third party certification system developed by the USDA to ensure compliance with specified production and processing protocols.

It is apparent that the mechanisms used to coordinate production and guarantee specific attributes can vary significantly in terms of the pricing methods used, program requirements, and traceability systems. This is partially a result of the different attributes being branded, but also a result of the level of consistency that programs seek to obtain. There is a significant variance in the structures used to produce consistently high quality, tender beef. Some programs are focused on achieving very high levels of consistency and have implemented more detailed pricing structures, program requirements, and traceability systems. Others are trying to move away from the inconsistencies that exist in the spot market and are seeking to increase quality, but are more relaxed in terms of their coordination and requirements and more accepting of some variation between animals.

5.2.3 Benefits of Improved Coordination

The perceived benefits of improved coordination indicated by the interviewees are numerous. Most significant is the improved flow of information along the supply chain. With increased coordination, more accurate information on consumers' demands is passed back from retailers and other end users to processors, feedlots, and cow-calf producers. Grid-based pricing systems convey more accurate economic signals regarding the quality of the product. The use of contracts and grid-based pricing systems to improve alignment between processors and feedlots has been quite common and facilitated the transfer of information to this sector, but information flow further upstream has thus far been limited. Alliances provide cow-calf producers with access to grid-based pricing systems and

information on the quality of their production, which was previously not available. Access to premiums creates incentives to make improvements to production systems, and the information made available to cow-calf producers can assist in their production decisions.

The interviews revealed that alliances also provided substantial benefits for seedstock producers. Alliances often try to align with specific seedstock producers who have shown they can produce animals that perform well in their program. For seedstock producers, this creates a dependable and potentially growing market if the progeny from their breeding animals perform well. In some cases, seedstock producers have also purchased cattle back from their customers and marketed these cattle through the alliance.

Processors benefit from having a constant, stable flow of product that can be processed and marketed through their various commodity and branded beef programs. When they do not own the brand, and either custom process cattle or have an alternative arrangement with an alliance, they still benefit from the constant flow through the plant that helps maximize plant capacity. Alliances also facilitate the transfer of information to processors, retailers, and other end-users regarding the source of cattle and the processes that underlie a brand assurance.

For retailers, the provision of a specific product through an alliance assists in differentiating the firm from its close competitors. Successful branded beef products can assist in building customer loyalty. Some retailers have limited the premium at which they sell their brand name product. Instead they use the product to increase consumer loyalty, which can yield increased returns beyond the meat counter in terms of overall grocery sales.

5.3 Transaction Characteristics

The interviews provided an opportunity to explore the importance to existing alliances of the transaction characteristics discussed in section three: specialized investments, price uncertainty associated with quality variability, information asymmetry and the number of buyers and sellers.

5.3.1 *Specialized Investments*

The results of the conjoint analysis reported in section 4 indicated that investments required of cow-calf producers was a very important transaction characteristic affecting their willingness to participate in a particular alliance. The interviews provided an opportunity to explore in more depth the nature of specialized investments and how this potential barrier to participation is managed. From Table 16 it is apparent that the alliances varied widely in terms of their requirements, with the most common requirement being that cattle follow a specific feed and health protocol.

Record and certification systems were also required by some alliances. Again, these varied with respect to complexity and the amount of time or capital required by cow-calf producers. The more standardized and simplified the record keeping system, the more willing producers are to participate in an alliance given the reduced time required to manage records. Logan McClelland, Executive Director of NCFB, indicated that the previous record keeping process required by NCFB had been unduly cumbersome and had limited producer participation. The organization responded to this problem by creating a standardized system that should reduce the amount of time required to input information, while improving the overall quality of the information obtained.

None of the alliances required significant farm improvement expenditures. The most common element of farm improvement was the adoption of HACCP-based programs that certify participating cow-calf producers, feedlots, and in some cases processors and retailers²¹. Other more detailed certification and audit programs were also apparent. For example, PM Beef has implemented a USDA process verified system that requires each individual animal to have a “passport”, including detailed information on the animal and on the production and processing procedures. USDA audits the production and processing components of the PM Beef supply chain on an ongoing basis.

Overall, the investments in human and physical capital required of cow-calf producers appeared to be quite small. Alliances have limited the investment required so as to encourage participation, confirming the results of the conjoint analysis that asset specific investments would be a significant deterrent to participation. Investments mainly focused on the implementation of feed and health protocols and record/certification systems. It is interesting to note from the conjoint experiment that both of these had positive part-worth values, which indicates that compared with farm improvement expenditures, these were relatively less threatening to cow-calf producers. Only minimal investments in specialized assets were required in most of the alliances, therefore, the risk of opportunistic behaviour is expected to be low. This is consistent with the observation that the coordination was fairly informal, such that contracts were not needed to ensure a buyer’s commitment.

The investments required of feedlots are similar to those required in the cow-calf sector. In some situations, the feedlots and processors initiating alliances incur additional costs associated with implementing computer vision scanning (CVS) technologies and tracking technologies. These costs can initially be quite high, but risk of opportunistic behaviour by other supply chain participants is expected to be low, as the investment is not highly asset specific. CVS and electronic identification/ tracking technologies are highly transferable and can be easily adapted for different purposes. Therefore, we do not expect to see significant transaction costs to reduce risk of opportunistic behaviour.

Overall, the risk of opportunistic behaviour as a result of investment in specific assets is minimal and has not had a great impact on the degree of supply chain coordination. This may be due in part to the limited amount of investment alliances have required supply chain participants to make in order to encourage participation. It may also be due to the reciprocal nature of the relationship between buyers and sellers in the supply chain. Buyers need to be able to ensure adequate supplies of a differentiated product, which is not readily available in the spot market. If they act opportunistically sellers will not be willing to transact with buyers in subsequent years, thus increasing the costs for buyers of searching out and procuring new supplies. Similarly, if sellers act opportunistically, buyers will choose not to deal with them in the future and they will lose a market in which to sell their differentiated product.

²¹ Hazard Analysis and Critical Control Point (HACCP) systems focus on identifying and preventing hazards within a production system. The objective of a HACCP based system is to analyze a production system for potential hazards and identify critical control points. Upon identification of critical control points, measures are established to reduce hazards. Ongoing monitoring and record keeping systems are then implemented.

Brand Ownership

This section explores the issue of asset specific investments with respect to brand ownership. Developing and owning a brand name label results in capital investments and transaction costs. Both physical and human capital investments are made in developing a brand and marketing it to consumers. If an alliance owns a brand they must pay listing fees to have their products stocked in retail stores. Listing fees can be quite expensive and may limit the feasibility of marketing a brand name product through a retailer. To avoid some of the high capital costs, several of the alliances indicated that they chose instead to be the exclusive suppliers into retailer-owned branded beef programs. In these cases, the retailer incurs the costs of developing and marketing the brand.

For many alliances that are initiated by participants in the production sectors, avoiding brand ownership may be a more efficient alternative for three main reasons. First, processors and retailers have more marketing expertise and experience in this sector. Second, given size advantages, retailers and processors tend to have more access to financial capital and can more easily absorb the capital costs involved with owning a brand name label. The interview with PM Beef Group revealed another reason for retailer ownership of a brand: consumers are already familiar with the retailer's reputation and brand name. Lower costs are incurred in educating consumers about the quality of the product as a retailer has an established reputation and has an incentive to maintain a positive image, thus lowering information costs for consumers.

The development of retailer-owned private labels has been an increasing trend in many countries across a wide category of foods. These have been successful in competing with manufacturer brand name products, providing grocery stores with higher profit margins and greater store loyalty from customers (Ward et al., 2002). This has been particularly important in the UK retail market, is occurring somewhat more slowly in Canada, and only recently has this trend occurred in the fresh meat sector. Lessons from the UK experience are insightful. The limited success of attempts by UK producer groups to develop regional brand loyalty for producer-owned branded meat products in the 1990s has been attributed to resistance from the major food UK food retailers, who were preoccupied with establishing store loyalty through their own private label meat products (Fearne, 1998). Having retailers on-side will be essential to the successful development of branded beef regardless of who owns the brand.

One of the biggest challenges, both for alliances that owned a brand name label or were the exclusive suppliers into a private label, is maintaining a constant flow of product in large volumes to meet year round demands. If the alliance fails to do this, consumer loyalty is undermined and retailers are not willing to work with an alliance. Meeting market requirements can be tricky as additional product cannot be easily procured through the spot market. In a sense, a brand name is a specialized asset and the supply chain participant that owns a brand name label, or is the exclusive supplier to a brand name, faces the risk that both suppliers and buyers with whom they have aligned will act opportunistically. There are high sunk investments in developing and maintaining a brand name label. There is a risk that suppliers could demand a higher price for this product than previously agreed, knowing that the buyer has downstream customer commitments and cannot procure the differentiated product on the spot market.

To reduce the risk of opportunistic behaviour by suppliers, buyers incur increased transaction costs to determine the reputation of suppliers, and establish and enforce the commitments made by suppliers. Search costs may be incurred in procuring adequate supplies for the program. The transaction costs associated with guaranteeing adequate supplies for a brand name program can be high, whether or not the label is owned internally or an alliance is the exclusive supplier to a brand name program.

To minimize these costs, several different measures are used to increase coordination and secure commitment. The majority of alliances, whether they owned or were the exclusive supplier to a brand label, required an increased level of commitment from participants compared to alliances that were not linked to a specific brand. Commitment was ensured through the use of annual contracts and in some cases participants were required to commit capital to the program in the form of membership fees or the purchase of shares. This varied between alliances: several used contracts that required cow-calf producers and feedlots to commit a certain volume of supply within a particular production period. These types of agreements reduce the overall information costs, but can increase ongoing negotiation and enforcement costs as individual contracts must be negotiated, and enforcement costs may arise if supply commitments are breached. However, the ongoing negotiation costs may be relatively small if contracts with cow-calf producers and feedlots are standardized and price is determined using a pre-specified grid pricing system.

The commitment of capital by alliance participants also varied considerably. Some alliances required new members to pay entrance fees or to purchase shares that gave them the right and obligation to deliver a certain number of animals each year. For example, as shown in Table 15, U.S. Premium Beef requires participants to pay a membership fee as well as purchase or lease shares. Similarly, Ranchers Renaissance requires a membership fee, with the fee tied to the number of cattle committed to the program. The commitment of capital to the program reduces the ongoing negotiation and enforcement costs incurred with the use of annual contracts, as the provision of capital by participants creates 'hostage assets'. If participants do not fulfill their obligations to supply a particular volume of animals into the program, they can be expelled from the program and their shares or membership fees will not be reimbursed.

Formal alliances that require participants to purchase shares and/or pay membership fees appear to be used mainly in situations where the volume of supply committed by individuals is large and membership is closed. In these situations, no further supply can be procured and it is essential to ensure the supply commitments made by existing members are fulfilled. Both U.S. Premium Beef and Ranchers Renaissance require that participants invest in the cooperative in order to ensure their commitment of a specific number of animals into the program on an annual basis. The use of contracts is more successful when supply can be procured on an annual basis both from existing alliance members and new members. In these cases, a lower level of commitment is required from individual participants and supply can be procured from a greater number of sources.

It appears to make little difference, in terms of brand ownership, whether an informal structure that relies on contracts or a more formal structure using hostage assets is used to ensure commitment. Nevertheless, ensuring commitment of supply chain participants to maintain a constant flow of product is necessary. For the Nebraska Corn Fed Beef program, which owns its brand name label, supply commitment has been a very large

issue. When cash prices outside the alliance rose substantially in the U.S. due to the discovery of BSE in Canada in May 2003, much of the supply that had been committed to the program was withdrawn and sold in the cash market. The program had not required cow-calf producers or feedlots to sign contracts prior to this time. As a result, the program was unable to meet the supply commitments they had made with end users and consequently lost customers.

Nebraska Corn Fed Beef is now working on implementing a contract system to ensure an adequate level of commitment by program participants. While NCFB requires the payment of annual fees to cover administration costs, it has not required participants to pay membership fees. The decision to move to a structure that requires participants to invest capital is expected to be dependent on a combination of factors that in addition to ownership of a brand. These factors include information asymmetry and the number of buyers and sellers and are discussed in sections 5.3.3 and 5.3.4 respectively.

One additional measure is used to ensure commitment of supply and to minimize the associated transaction costs. A number of the alliances required that cow-calf producers retain ownership of their calves through to processing, or at least share ownership with feedlots. In a sense, cow-calf producers are providing the alliance with an increased capital commitment, as they incur the additional feeding costs at the feedlot level and also the opportunity costs of having their capital tied up for a longer period of time. Retained ownership does not create a hostage asset, as finished cattle can still be sold into other markets. However, a cow-calf producer forgoes the opportunity to use their capital elsewhere. They have an incentive to stay with the alliance, rather than exiting and having to incur search costs to locate another market for their cattle. The role of retained ownership in reducing transaction costs is discussed in greater detail in section 5.5.

Alignment with Packer-owned Programs

Cow-calf producers and feedlots have aligned themselves with specific packers, focusing on the production of high-quality tender beef that fits into multiple existing commodity and branded beef programs that are owned by the processor. Typically, cow-calf producers and feedlots do not have to ensure the supply of a particular volume of animals into the plant on an ongoing basis. Instead, an approximate average annual volume that the alliance will market through the processor is agreed. Volume requirements are fairly flexible given that the percentage of product procured from the alliance may only be a small portion of the packer's total processing needs. Often, the packer is willing to accept as much production as the alliance can produce. Examples of alliances aligned with a specific processor include (see Table 16): GeneNet, Decatur Beef Alliance, and the Beef Marketing Group.

Program requirements are usually quite minimal; thus asset specific investments are also minimal. These alliances are more focused on using grid-based pricing systems to convey information along the supply chain and to encourage the production of high quality cattle. Based on carcass quality, and other requirements such as breed, cattle can be allocated into several different programs run by the processor. It may be possible to slot animals that do not fit one program into an alternative branded program. This avoids the problem of price discounts for failing to meet program requirements or in situations of excess supply to one program.

Lower information and negotiation costs are incurred due to the lower level of asset specificity and reduced risk of opportunistic behaviour. As the processor benefits from the

increased flow of high quality product into its plant, it has less incentive to act opportunistically towards sellers. The reciprocal nature of the relationship, with mutual benefits received by both parties, is important to the sustainability of this relationship. There is also less concern over ensuring adequate volumes of supply on an ongoing basis, consequently negotiation costs incurred to ensure supply commitments are reduced. Typically, those alliances that direct production into multiple programs owned by a specific packer require little more than a verbal commitment or a feeding agreement when the cattle are put on feed. Program fees usually range between \$3 and \$7 per head. These fees are not used to ensure commitment, instead they cover the costs of tagging cattle and measuring quality. Neither party requires a long-term commitment, and typically cattle can be entered into the program at anytime prior to being processed.

5.3.2 Price Uncertainty Associated with Quality Variability

For product attributes such as tenderness, grid-based pricing systems are a more efficient method to transfer market signals on consumer demands. There is a reallocation of risk, with cow-calf producers and finishing feedlots accepting the risk that cattle grade poorly. This provides a strong incentive to produce high quality cattle. Most of the alliances interviewed used grid-based pricing systems, although the type of price grids varied. More detailed grids allowed information costs to be reduced more effectively. Table 15 indicates that GeneNet and PM Beef Group have more detailed grids. Monitoring costs are lower compared with a program that uses detailed production requirements and protocols to ensure quality. It is likely that the initial information costs incurred to reduce price uncertainty by establishing a grid are low and are offset by the long term reduction in information and monitoring costs.

Encouraging Producer Participation in Grid-based Pricing Systems

Although the use of grid-based pricing systems is increasing, it was widely recognized in the interviews that a portion of cow-calf producers are hesitant to price their cattle this way. It is difficult for cow-calf producers to completely eliminate uncertainty over the price they will receive. A risk averse cow-calf producer may prefer a live-weight pricing system where the price they receive is more predictable and they are not exposed to the risk that they will receive price discounts upon cattle being processed. How to encourage producer participation so that consumer demands can be met on a more consistent basis is a critical issue for branded beef alliances. Two methods to encourage participation were commonly used by the alliances.

First, there are methods to help individuals manage their exposure to risk. The base price, from which carcass quality premiums and discounts are added or subtracted, is established using an average weekly spot market price at the time of processing. Given the production decision to marketing time lag, it is difficult for producers to project the expected base price and net returns. For PM Beef, the base price is determined by the futures market price for the expected month of delivery. Producers have the option of locking in their price anytime up until cattle are processed. This provides them with a greater ability to determine and control their expected net return. Other alliances use similar techniques, assisting individuals in hedging their production on the futures market in order to lock in a base price or allowing producers to establish a forward contract with a specified base price.

Nebraska Corn Fed Beef allows individuals to sell their cattle on a live weight basis, while providing them with quality information that outlines how their cattle would have performed on the grid-based pricing system. This has been very successful in encouraging participation. Currently, over 75 percent of producers are pricing their cattle through the organization's quality grid, while the remainder either forward contract their cattle or sell them on a live weight basis.

The second strategy to encourage participation is educating cow-calf producers about the other benefits of a grid-based pricing system. The majority of the alliances placed less emphasis on the ability of grids to provide premiums and more focus on the value of the information provided. Prior to the creation of these pricing systems, access to information on the quality of production was limited. Access to information on the quality of their production through the program facilitates changes that improve quality and makes cow-calf producers more competitive.

One view was that a two tiered market is slowly developing, with higher prices being received for cattle purchased on a grid-based pricing system (Weibert, 2004). In the cash market buyers are taking on the risk that quality will be low and they are passing that risk onto feedlots and cow-calf producers through lower prices. Processors and other buyers are paying for the information on product quality made available through the grid, to which they do not have access when using live weight pricing mechanisms.

Does Grid Pricing make Alliances Redundant?

Why are alliances necessary if a grid-based system can improve the flow of information and increase the quality of cattle? Three main reasons emerged from the interviews. First, alliances coordinate the cow-calf sector with the rest of the industry through a common transaction format. Instead of negotiating multiple separate transactions with numerous individuals, an alliance aligns cow-calf producers with specific feedlots and coordinates transactions with a packer. The alliance negotiates on behalf of multiple individuals for a large volume of cattle, thereby reducing negotiation costs for the supply chain as a whole. After processing, the alliance administers the transfer of information back along the supply chain. Without the standardized coordination of transactions along the supply chain it would be more costly to link the large number of cow-calf producers, with small numbers of cattle, to the rest of the supply chain.

Monitoring costs are also reduced. Grid-based pricing systems may result in monitoring costs for producers in ensuring that processors do not falsify carcass grades to pay lower prices. Under an alliance, these monitoring costs are reduced because a processor has an incentive to maintain a positive relationship with the alliance given the benefits it receives from having a consistent flow of high quality product into its processing plants on an ongoing basis. The alliance transacts with a processor on a more frequent basis than would individuals, and there is a greater reliance on trust to ensure proper carcass grading.

5.3.3 Information Asymmetry

The alliances branded experience, credence, and search attributes. Program requirements and certification ensure that the production of different credence attributes can be guaranteed to downstream customers. Three of the alliances produced natural beef with no hormones or antibiotics. In addition to providing natural beef, Highland Premium Beef Alliance also brands a portion of their product with the guarantee that the beef was raised in Alberta. Nebraska Corn Fed Beef guarantees that product is corn fed and raised in

Nebraska. PM Beef provides consumers with a guarantee that the source and process for all of its beef can be verified. With the exception of Nebraska Corn Fed Beef, all of the alliances guaranteeing credence attributes rely on affidavits and third-party certification to ensure compliance and reduce the problems associated with information asymmetry. Typically the third party certification systems require alliances to submit regular records. Random audits are performed throughout the supply chain on an ongoing basis.

Nebraska Corn Fed Beef verifies the production of its credence attributes through an internal certification and audit process. Participants are required to follow the Beef Quality Assurance program, which reduces quality and consistency problems through the implementation of specific feed, health, and management protocols. Detailed production records are also required, and are subject to random internal audits on an ongoing basis.

The systems used to guarantee experience and search attributes, namely tenderness and leanness, vary significantly. Some alliances have implemented detailed production and management protocols to reduce overall variability. The more detailed protocols become, the higher are the compliance costs. As a result, the incentives to cheat increases because attributes are not easily detected prior to consumption. To reduce information asymmetries and ensure compliance, alliances with detailed program requirements usually implemented internal certification and audit systems.

In some cases, the move from a more informal alliance to a formal new generation cooperative has also facilitated compliance with more detailed program requirements. In the case of Ranchers Renaissance and other new generation cooperatives, participants have committed capital to the cooperative that is non-refundable. This creates an incentive to comply with the program and reduces the need for monitoring. New generation cooperatives provide for greater control.

5.3.4 Number of Buyers and Sellers

Tighter program specifications reduce the number of eligible buyers and sellers and, as a result, closer coordination is necessary to ensure adequate supplies. For example, Laura's Lean Beef requires that cattle are of an exotic breed and have been raised with no hormones or antibiotics. This limits the number of cattle eligible to be marketed through the program and it is very difficult to procure adequate volumes through the spot market.

From the buyer's perspective, significant search costs are incurred to procure adequate volumes of lean and natural cattle. To ensure adequate volumes of these cattle, negotiation costs are also incurred, with contracts used to ensure the commitment of sellers. Sellers are also concerned with ensuring market access due to the specialized nature of the product they are selling and the limited number of buyers that are willing to pay a premium for that product. Consequently, they will incur search and information costs to find buyers and determine their reputations. The increased transaction costs encourage closer vertical coordination.

If both the numbers of buyers and sellers for a specialized product are small, a mutually beneficial relationship exists and the risk of opportunistic behaviour by either party is low. For example, Highland Premium Alberta Beef has limited access to alternative suppliers that can fulfill their needs, and sellers also have limited access to alternate markets to sell their natural cattle. This creates a mutually dependent relationship and a low risk that either party will break commitments. A similar situation exists for other alliances that operate in niche markets with a small number of buyers and sellers. In these situations, it

appears that transaction costs are minimized and, while increased coordination may be required to ensure the production of particular attributes, a small number of buyers and sellers does not necessitate increased coordination.

5.4 Critical Success Factors and Challenges for Alliances

5.4.1 Creating Value Along the Supply Chain

Having discussed the importance of the key transaction characteristics identified in section three, we now turn to an examination of additional factors that influence supply chain coordination. One of the most significant challenges that many of the individuals interviewed identified was creating value along the entire supply chain. To encourage participation in the alliance, the benefits of participation have to be greater than the associated costs. The production of differentiated attributes can increase transaction costs and production costs. Changes to existing production and processing practices may create inefficiencies that do not exist in the commodity oriented system and include restrictions on the use of technologies, such as hormones and antibiotics, and lower volumes.

With higher production and processing costs, the price charged to consumers is higher than the price of commodity oriented beef products, and not all consumers are willing to accept a large price differential. Consequently, the market size for many products and the potential to create value is limited. In a sense, the market is in disequilibrium. Some alliances are unable to ensure that the benefits received by all parties are greater than the costs incurred. In the long run, it is likely that these alliances will move in one of three directions. First, they may choose to restructure to ensure value is distributed based on the increased costs incurred by each sector. Second, if costs outweigh benefits, alliances may restructure their existing focus and program requirements to better meet consumer demands so as to boost the return to all alliance participants. Finally, if they are unable to restructure it is likely these alliances will disband.

One alliance had examined branding beef based on an enhanced food safety program implemented throughout the production process (Borck, 2004). However, while there may be a demand for enhanced food safety, consumers' willingness to pay a premium appeared to be limited. As a result, it is unlikely that the alliance would be able to recoup the increased production and transaction costs. Similarly, the emergence of process and source verification systems is likely to increase in the future in order to guarantee other attributes. However, it is unclear whether these attributes alone would command a price premium. This may be because consumers are coming to expect source verification of all beef products as a means of ensuring credible food safety or quality assurance claims..

Short term market fluctuations can arise where costs for some participants may exceed the benefits for a period of time. Getting participants to accept short term losses has been a priority for many of the alliances. Over the long run, it is important that the benefits exceed the costs. The difficulty is in determining whether the market is in short run disequilibrium or whether a structural failure exists and the alliance is not viable in the long run. This is a particular problem for newer alliances. The alliance must be flexible, have in place a good communications management strategy that ensures the interests of all participants are represented, and be prepared to adapt the alliance if a long-run structural problem becomes apparent.

5.4.2 *Marketing the Entire Carcass*

Selling the whole carcass at a premium to offset the increased costs associated with producing differentiated beef products is a problem. In general, only a portion of the carcass can be sold at a premium. Some cuts are not as popular with customers and, as a result, their willingness to pay a premium for these cuts is lower. Therefore, in order to recoup increased costs, larger premiums must be charged on a portion of the carcass, while lower or no premiums are available for the rest of the carcass. Being able to market an adequate portion of the carcass at a premium to offset increased costs has been identified by many alliances as a major challenge. It is especially important for those alliances that market product into their own brand name label or an exclusive private label. Typically they have higher average costs than alliances that market products into multiple processor-owned brand programs. Their transaction costs may also be higher given the importance of ensuring the commitment of suppliers. Alliances that market product into multiple brand programs have an advantage because they have lower transaction costs and are typically able to market product into multiple brands and sell a larger portion of the carcass at a premium.

Several alternative approaches have been used to improve the marketability of the carcass. Alliances such as GeneNet, Cow Camp Beef Alliance, and the Beef Marketing Group have chosen to market product into multiple brand name labels rather than developing their own brand or an exclusive supply relationship with a private label. This lowers their average production and transaction costs. It also increases the available markets in which to sell different portions of the carcass at a premium and reduces the discounts that are often incurred by programs that have access to few alternative markets.

Alternatively, NCFB has chosen to establish their own brand name label, but purchases back from the processor only those cuts of meat that can be sold at a premium. The processor sells the cuts back to the alliance with a processing margin added back into the price. The remainder of the carcasses or portions of the carcass are sold through the processor's branded and commodity based programs using a grid pricing system. While this method does not increase the portion of the carcass sold at a premium through the brand name label, it provides access to an alternative market to sell other products.

Other programs have taken steps to increase the percentage of the carcass sold at a premium through the brand name label. Research and development has been targeted at producing alternative value-added products from cuts of meat that are otherwise difficult to sell at a premium. For example, Laura's Lean Beef has expanded into the production of pre-cooked products, frozen patties, and other convenience oriented products. Ranchers Renaissance has taken a different approach and brands the whole beef case in the retail stores to which it sells. They are able to obtain a larger premium for their tender-verified products, while also obtaining a smaller premium for those products that are not tender-verified but guaranteed to be consistent and process verified.

Many alliances sell to multiple end-users to increase the percentage of the carcass sold at a premium. Demand is limited to only the most popular cuts for many end-users in the food service sector and limits the percentage of the carcass that can be sold at a premium. Selling into multiple retail and end-user markets can increase the percentage of the carcass sold at a premium.

5.4.3 *Managing Product Flow*

Managing product flow throughout the supply chain has been identified as a significant challenge for several reasons. First, to ensure supply on an ongoing basis many alliances that own a brand, or have an exclusive relationship with a retailer-owned label, have tried to encourage producers to adjust their calving periods. For example, NCFB and several other alliances encourage fall calving rather than the more common practice of calving cows in the spring. This provides a more consistent flow of finished cattle on a year round basis, but its acceptance by cow-calf producers has been limited due to increased costs in terms of the labour and capital resources required. On mixed farm operations, producers may prefer to complete calving prior to seeding and/or harvesting crops. Calving later in the year also requires the maintenance of calves into the winter, which can result in higher costs and lost revenues due to lower rates of gain in areas where winters are harsh.

Encouraging producers to adopt alternative calving patterns requires offsetting the increased costs. Nebraska Corn Fed Beef pays premiums for cattle that will be finished in periods of the year where product supplies are typically lower. Producers are required to commit cattle at specific time periods. Although this has encouraged some cow-calf producers to alter their calving period, success with mixed farm operations is lower. In situations where acceptance has been low, programs have chosen alternate measures to manage supply.

Some programs, such as Ranchers Renaissance and U.S. Premium Beef, pull supplies from different regions where, due to climatic differences, average calving and finishing times vary, resulting in a more consistent supply through the alliance. Supply flow is also managed through grazing programs and other feeding regimes that adjust the finishing times of cattle to better suit demand. Alliances that supply into multiple packer-owned programs, and do not own a label or exclusively supply into a retailer-owned label, are not required to maintain as consistent a flow of animals into the processor and thus are less focused on encouraging producers to make changes to their existing production schedule. Examples of such programs include Cow Camp Beef Alliance, GeneNet, and Decatur Beef Alliance. Producers are more likely to participate in these types of alliances if they operate mixed farms and do not wish to change their production schedule.

The second challenge related to managing product flow occurs in the relationship between processors and alliances. Processors have looked to alliances as a method of securing adequate supplies of cattle, which enables them to make supply commitments to their downstream customers. Ensuring a portion of cattle supplies through the use of alliances may also help a packer operate at capacity, and therefore helps protect narrow margins in this sector. The Beef Marketing Group (BMG) is an example of an alliance that was formed specifically to provide an IBP plant in eastern Kansas with an ongoing base supply of cattle. Previously the plant had struggled to obtain the volumes it required on a consistent basis. In exchange for the supply of cattle, IBP has developed a preferential pricing agreement with the alliance. A legal challenge to this relationship from feed yards and the U.S. government in the late 1990s alleged that the Beef Marketing Group received unfair preferential treatment. The lawsuit was defeated, but the opposition of some beef industry participants signals a potential barrier to the development of these types of relationship in the future. This opposition arises mainly because of concerns that alliances result in reduced competition and a movement away from transparent pricing on spot markets. Essentially, there is opposition to the emergence of a two-tiered market where

cattle that are sold in the spot market may be discounted. This opposition has resulted in a push for regulatory intervention and lawsuits against organizations involved in closer vertical alliances, including exclusive pricing agreements, supply contracts, or custom feeding of cattle by a processor.

While opposition is usually targeted at limiting processor control in the form of ownership of cattle supplies, many of the arrangements used to improve coordination and produce differentiated products may be vulnerable if there is a perception that regulatory or legal intervention could be forthcoming. Warren Weibert, of the Decatur Beef Alliance, has struggled to establish an exclusive pricing agreement with Excel which he believes could increase the value received by alliance participants and boost overall alliance participation. IBP appears to be hesitant to enter into an arrangement due to the increased opposition and the associated lawsuits.

Whether closer supply chain relationships are emerging to increase the production of differentiated beef products or to maintain an adequate flow of product throughout the supply chain, it appears that the industry is moving in this direction regardless of opposition from some quarters. If a two-tiered market system is emerging, where cattle are sold either through the spot market or by methods of closer coordination, it is likely that spot market prices will be lower due to quality uncertainty. Regulatory intervention to prevent such a situation will only serve to disrupt the market and constrain the ability of the industry to respond to consumer demands through more responsive supply chain relationships. The opposition to increased coordination, ironically, also threatens new generation cooperatives. U.S. Premium Beef is a producer-owned cooperative that is the majority owner of the fourth largest processor National Beef. While opposition to date has been targeted at processing companies owning cattle supplies, the producer cooperative is also vertically integrated. If regulatory intervention limits vertical integration in the beef industry, it is possible that these operations will also be affected.

5.4.4 Concentration in the Processing and Retailer Sectors

The meat packing and retailing sectors in Canada are highly concentrated and the degree of concentration is expected to increase in the future. This will affect the development of alliances in two ways. In the U.S. after a packer or retailer has aligned with a few successful programs, it appears that the firm is far less likely to become involved with additional alliances. There are increased management costs, including the opportunity cost of human and capital resources required to organize additional programs, administer several different grid-based pricing systems, and segregating processing runs. In addition, retailers are reluctant to run more than one or two branded programs in their stores. Retailers are more likely to develop a single brand name label and have a limited number of supply chain relationships to procure product for that label. Thus, barriers to entry for new alliances are likely to grow over time.

In the future, alliances will likely be required to supply substantial volumes of cattle to fulfill the requirements of branded programs. This was not a problem in the establishment of many of the existing alliances interviewed. When they were initiated very few similar programs were in existence and processors and/or retailers were willing to work with them even if they initially only marketed small volumes of cattle. These alliances were able to grow slowly to their current size. However, as more alliances have emerged, and concentration in the processing and retailing sectors continues to increase, it is less likely

that these firms will be willing to work with alliances that supply small volumes of cattle at the outset. At the same time, supplying large volumes of cattle is less feasible for new alliances. An inability of new alliances to start small and expand slowly may be a limiting factor in the number of new alliances that emerge within the Canadian industry in the future.

Within the U.S. industry, the alternative of creating alliances with mid-size processors and retailers has been available. These firms benefit from the creation of a differentiated value-added market in which they do not have to compete with their larger competitors based on price. Alliances benefit, as typically they do not have to supply the substantial volumes of cattle that are required by larger processors and retailers. This allows them to grow and develop more slowly. PM Beef Group and NCFB are U.S. alliances that have created successful relationships with mid-size processors and/or retailers. They were able to establish themselves on a smaller scale and ensure an adequate supply prior to increasing the volumes supplied into processor-owned or private label programs. In addition, those alliances with their own brand name typically are smaller. Large processors are not willing to work with them due to the lower operational efficiency associated with segregating small volumes of production. Similarly, large retailers are not willing to market small volumes of product.

While this has been feasible in the U.S., we are likely to see a very different story in Canada, where few mid-size packers or retailers exist. A few large firms dominate both sectors. New alliances may choose not to have their own brand name, given the substantial costs associated with developing and marketing a label. In addition, maintaining the substantial volume of cattle that would be required under such a structure results in high transaction costs. To minimize marketing and transaction costs, alliances in the Canadian beef industry are more likely to focus on marketing into existing processor-owned or private label branded programs. Less exclusive relationships may also occur, where multiple alliances supply into packer-owned programs or private label retailer programs using the same grid-based pricing arrangement and more general program requirements.

5.5 Additional Strategies to Improve Coordination

A number of other mechanisms to improve supply chain coordination exist in addition to contracts and alliances. These include retained ownership, certification systems, electronic identification and information management systems. These are discussed below.

5.5.1 Retained Ownership of Cattle by Cow-calf Producers

Most of the alliances interviewed either required or strongly encouraged cow-calf producers to retain ownership of cattle until slaughter. When producers retain ownership of cattle, transactions at the cow-calf producer/feedlot interface change and the feedlot becomes a “hotel” where cattle are fed on a custom basis. Cow-calf producers transact directly with packer. While an alliance typically facilitates the interaction between cow-calf producers and the packer, the direct interaction between these two parties may increase the incentive for cow-calf producers to produce high-quality cattle with specific attributes. The returns to producers become directly dependent on the finished quality of cattle.

The improved alignment of incentives should result in lower transaction costs in terms of determining the reputation of sellers and monitoring production to ensure compliance with program requirements. At the same, transaction costs are also reduced as

information, in the form of data and economic price signals, is transferred directly from the packer to the cow-calf producer. This creates a more transparent flow of information to guide production decisions. It is unclear whether negotiation costs are reduced. While pricing arrangements are only negotiated between producers and packers when ownership is retained, a flat rate custom feeding fee must be negotiated between cow-calf producers and feedlots. It is expected that the negotiation costs associated with a custom feeding fee are minimal, as a result of it being standardized.

Retained ownership may also increase the value received by cow-calf producers by capturing premiums on the entire farm-feedlot production process. Whether or not the increase in premiums will offset the opportunity costs associated with retaining ownership will vary depending on each cow-calf producer's situation. It is likely that producers who operate mixed farms will be less willing to retain ownership of cattle, as they will have to use capital resources allocated for other farm enterprises to pay custom feeding charges. They may also depend on the revenue derived from the sale of their calves to finance other enterprises; they would not have access to this capital until the sale of finished cattle.

To encourage smaller cow-calf producers to retain ownership, other alternatives have been provided, such as feedlots partnering and sharing ownership of a producer's cattle through to processing. GeneNet, PM Beef Group, Cow Camp Beef Alliance, and several other alliances allow cow-calf producers to partner with feedlots and share ownership. This reduces the capital that producers are required to commit, while still maintaining the direct link between a producer's returns and the finished quality. For example, NCFB, Laura's Lean Beef, and Highland Premium Alberta Beef allow calves to be purchased by feedlots. Alliances that allowed cow-calf producers to partner with feedlots or sell their calves to feedlots indicated that initially providing these options often encourages cow-calf producers to retain ownership over the long run. When cow-calf producers receive information on the quality of cattle produced and the premiums paid at the feedlot level they are often encouraged to increase their involvement in order to capture the potential premiums available from retained ownership.

5.5.2 Certification Institutions

A third party that verifies production and processing methods and provides certification is often necessary for credence attributes. Highland Premium Alberta Beef and Tee Creek Beef are both Canadian-based alliances that produce natural beef (a credence attribute). Both of these alliances indicated that obtaining third-party certification for their product has been a significant challenge, as currently there is no standardized institution to provide such certification in Canada. Both of the alliances have worked with the Canadian Food Inspection Agency to develop a certification system, but this took a substantial amount of time and effort. As the Canadian beef industry continues to produce increased numbers of differentiated products, third party certification institutions will become more important. The development of these systems is an important topic for industry consideration and a potential area of further research.

5.5.3 Electronic Identification and Computer Vision Scanning Systems

Electronic identification has the potential to improve traceability and verify the source of individual animals in the beef industry. The computer vision scanning systems (CVS) and data management systems used with electronic identification could also facilitate the transfer of substantial amounts of information regarding the quality of individual animals. Information can be gathered on the production and processing methods used, live animal quality, and carcass quality. Electronic identification enables cattle to be mixed in feedlots and at processing plants, as the identification tags can link an individual animal with a specific owner. This may enable cow-calf producers with a small number of cattle to retain ownership, whereas previously feedlots preferred not to mix ownership within lots and preferred larger lots of animals for operational efficiency.

The Decatur Beef Alliance uses electronic identification to sort and commingle cattle in feedlots. The alliance uses the Micro Beef Technology ACCU-TRACTM Electronic Cattle Management System, which measures and manages individual animals using CVS, to optimize finishing quality. Every animal in the alliance is measured with the ultrasound technology, which evaluates carcass quality characteristics of the live animal. Key to the success of the system is the use of electronic identification that can link a specific animal back to its owner. When the cattle are sorted based on carcass quality characteristics they are commingled into mixed ownership lots. Cattle can then be sold when they reach the point at which they will maximize returns. Previously, cattle from each owner had to remain in separate lots, as it was too difficult to manage the record keeping associated with mixed ownership lots. Cattle were managed based on the average finishing time of cattle within the lot rather than on an individual animal basis. In the Decatur alliance, a producer's cattle can be sold over several different periods, while the associated record management costs are reduced through the use of electronic identification tags.

Electronic identification tags can also be used in conjunction with other systems that produce credence attributes where it is necessary to implement a traceability system to ensure compliance with program requirements. Information on individual animals and on the production and management processes is entered into a database, with information linked to an animal's electronic identification tag. The multiple uses of electronic identification tags potentially can assist in improving coordination and transferring information throughout the supply chain.

The adoption of this technology is currently limited. This may be because cow-calf producers must incur the costs of purchasing the tags and, unless they retain ownership of calves, they do not necessarily receive any benefits or information due to the low level of coordination that currently exists with the rest of the supply chain. The use of electronic identification technology has also been limited as very few feedlots and processors have implemented the scanning technologies and associated databases that are required to read and use electronic identification tags. The high cost of this equipment appears to have slowed its adoption.

If the Canadian Cattle Identification Agency (CCIA) introduces electronic identification tags, scanning technologies could be adopted throughout the supply chain to verify source. The CCIA system, while presently focused on packer-to-producer traceability, has the potential to be part of wider quality assurance programs, tied into

information management database systems that gather and transmit production and quality information at many stages of the supply chain.

5.5.4 Information Management Systems

Information management systems, used in conjunction with individual animal identification, could improve the transfer of information on quality and on production methods. As a result, some industry players are developing more comprehensive systems to gather and interpret information, and increase the availability of this information throughout the supply chain.

Two examples of new information management systems in the Canadian beef industry include ComputerAid Professional Services and Viewtrak Technologies. Both of these companies work with supply chain participants and alliances to develop customized information management platforms to gather and analyze both production and financial data. Technological developments have allowed for long term retention of information in extensive databases. Being able to retain large volumes of data facilitates more informed management decisions related to production and processing (Tollens, 2004).

The mandatory CCIA tagging program in Canada could potentially facilitate the transfer of information along the supply chain and reduce the transaction costs associated with transferring information. The transfer of information between the cow-calf sector and the rest of the supply chain is especially poor. This is because information management systems are very costly and most cow-calf producers cannot justify such an investment given the size of their operation and the value they would receive from such an investment. To increase coordination and improve the flow of information between cow-calf producers and other supply chain participants, the CCIA could be used as a conduit to facilitate information transfer. Rather than having multiple private corporations developing separate data management systems it may be more efficient develop a national system from which data could be drawn from by different supply chain participants. A single system may reduce the overlapping development costs that would be incurred by multiple information providers that are working to achieve similar objectives. These issues bear further investigation.

When multiple information collection systems exist, supply chain participants incur transfer costs if they move from one system to another. Consequently there are barriers to entry and exit. If cow-calf producers or other supply participants are required to enter into one system and pay to input information into that system, they are limited to transacting with those buyers within that particular supply chain. As a result, there is an increased risk of opportunistic behaviour and transaction costs will be increased in order to mitigate this risk. On the other hand, with a single standardized system, participants have access to a large number of buyers, with no transfer costs being incurred to access these buyers. In this type of system, the risk of opportunistic behaviour and associated transaction costs may be reduced. Clearly, issues of privacy protection and access to information would have to be addressed. Understanding the benefits and costs associated with developing competing private data systems or a nationally-based data system is an important area for future research.

6 CONCLUSIONS

There has been limited research on supply chain coordination within the beef industry and on how the relationship between different supply chain participants evolves with differentiated beef products. This research is critical for identifying what makes a successful supply chain alliance and understanding both the opportunities and constraints to improving coordination along the beef supply chain. An understanding of how different product attributes affect transaction costs and result in the formation of particular supply chain relationships is a first step towards determining what makes a successful alliance.

The purpose of this study was to examine the effectiveness of different alliances and their ability to coordinate branded beef programs. Improving coordination will only be successful if the value received by the industry more than offsets the increase in production and transaction costs. These costs are dependent on both the types of attributes being produced and the level of consistency that is guaranteed. Additional opportunities and constraints to improving coordination in the beef industry were also identified. This concluding section offers a summary of the key findings from the study and provides suggestions for future research directions.

6.1 Cow-calf Producer Survey: Key Findings

Transaction characteristics and the associated transaction costs can limit the willingness of cow-calf producers to participate in branded beef programs. While cow-calf producers are willing to make trade-offs and accept increased costs, they are only willing to do so when benefits are greater than costs. To some extent, respondents indicated a willingness to make the required investments and increase their exposure to opportunistic behaviour. Beyond a certain point, when large expenditures or one-time fees are required, the information and negotiation costs incurred to reduce the risk of opportunistic behaviour exceed the benefits received and limit participation.

It appears that cow-calf producers are most concerned with the balance between premiums received and costs of required investments. Relatively less importance is placed on the number of buyers and the pricing method. This implies that price uncertainty is less of a concern and, as a result, lower transaction costs are incurred to ensure the reputations of buyers, searching out information on grid-based systems, and negotiating agreements to secure price and market access.

The assurance of access into a premium market and the ability to receive information on the quality of cattle after they have been processed were rated as important features of a branded beef program. However, this does not tell us how cow-calf producers make trade-offs between these benefits and other characteristics (i.e. expected premiums, investments, pricing method, and number of buyers). Further research examining the trade-offs between these benefits and other program characteristics would shed more light on this issue.

The relationship between pricing method and the receipt of quality information is worth emphasizing. Cow-calf producers indicated a preference for a combination of live weight and carcass quality pricing, even though using this method means that some of the risk associated with variability in cattle quality is transferred to them. It may be that they are willing to accept the increased risk of price discounts in exchange for the quality information typically received with this pricing system. If this is the case, it is an indication

that cow-calf producers value the receipt of quality information relatively highly and are willing to make trade-offs to receive it. At the same time, the value of carcass quality information is offset by the transfer of greater risk that occurs under a pricing system based solely on carcass quality. Cow-calf producers, on average, remain wary of price being determined solely on the basis of carcass quality.

6.2 Alliance Interviews: Key Findings

Interviews were conducted with key managers and directors of a number of alliances in Canada and the United States. Several general conclusions emerged. Asset specific investments have typically been limited to compliance with specific feed and health protocols and the implementation of record/certification systems. As a result, the risk of opportunistic behaviour appears to be minimal, and the transaction costs to reduce opportunistic behaviour associated with asset specificity are small. Consequently, the degree of coordination is not affected to any great extent by the level of investments required.

Instead, coordination appears to more a result of how an alliance is aligned with a particular brand name label. Those alliances that own a brand, or have an exclusive relationship with a retailer-owned brand name label, face an increased risk that sellers will act opportunistically given the fixed nature of their supply and the ongoing need to fulfill downstream obligations. A formal alliance structure, which uses contracts and/or membership fees, is often used to mitigate this risk.

Alliances have readily adopted the use of grid-based pricing systems to improve information flows and provide incentives for improving quality. These systems reduce information costs from searching out quality information and, as a result, reduce the degree of coordination required. It is also feasible for grid pricing systems to reduce monitoring costs. Less monitoring is required when price is directly tied to the quality of production through a more detailed grid.

The numbers of buyers and sellers did not seem to have a substantial impact on the degree of coordination chosen by alliances. This mirrors the results from the cow-calf producer survey, where the relative importance of the number of buyers was low compared to other transaction characteristics. In large part, this appears to be a result of the reciprocal nature of the relationship between buyers and sellers along the supply chain. Sellers with specialized products need to be guaranteed access into the markets that sell these products. Buyers also need a constant supply of specialized products, which cannot be easily procured through the spot market, in order fulfill their downstream obligations. Consequently, the risk of opportunistic behaviour by either buyers or sellers is expected to be minimal and does not have a large impact on the degree of coordination.

The relatively low concern over the number of buyers, even when the number of buyers is limited, is apparent in that most of the alliances did not have formal contracts or arrangements to secure the commitment buyers. Alliances rely on the fact that buyers receive benefits from obtaining an ongoing and consistent supply of product and have an incentive to maintain positive relationships with their suppliers.

6.3 Implications for the Industry

Improved coordination between supply chain participants facilitates the development of differentiated products that are more consistent and of a higher quality. Several critical success factors and challenges to the successful development of branded beef alliances are apparent from this research.

6.3.1 *Critical Success Factors*

Both production costs and transaction costs arise in producing branded beef products. There is a limit to the level of premiums that consumers are willing to pay. As a result, the premiums available throughout the supply chain do not always offset the increase in production and transaction costs. This problem may be a result of short term market fluctuations. In this situation, the long term commitment of supply chain participants is necessary in order to ensure the ongoing success of an alliance. It is also important to note that aside from weighing costs against the premiums received, the value of other benefits needs to be considered. Access to markets and the ability to obtain increased information are significant benefits of alliances and need to be considered when determining the net gain received from participating in a program.

Improved information flows are also important to the success of coordination initiatives and the production of differentiated branded beef products. Cooperation and flexibility within a program is necessary to facilitate the transfer of information both upstream and downstream along the supply chain. The industry needs to continue to work on transferring information along the entire supply chain, especially to feedlots and cow-calf producers. Up to this point, the transfer of quality information and accurate price signals to cow-calf producers has been limited. Key to the increased transfer of such information is the development of different methods that enhance information flow, while minimizing the associated transaction costs. These methods include the continued advancement of grid-based pricing systems to provide more transparent price signals to cow-calf producers and feedlots. Integrated information management systems are also important. This technology has the potential to reduce information costs while substantially improving the flow of detailed information throughout the supply chain.

Critical to improving information flows, while minimizing the association transaction costs, is how alliances are linked to processors and retailers. All of the alliances examined were linked to specific processors and in some cases they were linked directly to the retail sector. While the success of alliances did not seem dependent on direct alignment with the retail sector, alignment with a processor(s) was considered to be essential to the success of an alliance. Processors are the main interface between end-users and the production sectors and key to the transfer of information between end-users and the rest of the supply chain. They facilitate the production of their own branded and commodity beef products and also custom process for brand name labels owned by retailers.

6.3.2 *Critical Challenges*

Although alignment with a processor is usually necessary to the success of an alliance, the high concentration of the processing and retailer sectors limits the number of alliances that can be expected to develop and be sustainable. This is partly a result of the large volumes of cattle required to fulfill the requirements of processor or retailer-owned

brand name labels. Coordination to ensure adequate supplies becomes quite costly, with high negotiation and search costs. The low level of concentration in the cow-calf sector requires transactions with a large number of cow-calf producers to ensure adequate volumes.

Coordination with processor and retailer-owned brands may be limited by the concentration of these sectors. Once processors and retailers have developed a few brand name labels and aligned themselves with a couple of alliances they may not need to form additional alliances or develop additional branded products. This reduces the transaction costs associated with organizing multiple production runs when production has to be segregated, multiple grid-based pricing systems have to be managed, and multiple sets of negotiations must occur. It creates an important first mover advantage for those alliances that are quick to develop a successful relationship with a packer and/or retailer and acts as a potential barrier to entry to latecomers.

The structure of alliances will be further impacted by how they are aligned with a brand. Marketing and transaction costs are expected to be higher (for the alliance) when an alliance owns a brand name or is the exclusive supplier into a retailer-owned brand. There are increased costs to ensuring adequate supplies and the commitment of alliance participants. As a result, it appears that some alliances have opted to operate under a different structure. In particular, there has been an increased emergence of more informal alliances that align themselves with a specific processor and market product through multiple processor-owned branded and commodity beef programs. This type of relationship also overcomes the limited willingness of processors to work with several different programs. Multiple alliances can be established that supply product into processor-owned programs using similar agreements, pricing arrangements, and program requirements. This limits the number of brand name labels and the production and transaction costs involved with having many different exclusive arrangements. At the same time, it allows for a greater number of alliances to work with a processor. This may enable individual alliances to supply smaller volumes, reducing the transaction costs associated with ensuring adequate supplies.

The structure of cow-calf operations also presents a challenge to the development of alliances and improved coordination within the industry. Producers often run mixed farming operations and, as a result, the opportunity costs of reallocating human and capital resources from other enterprises into cow-calf production may be high. This may limit the willingness of cow-calf producers to participate in alliances. The participation of cow-calf producers is necessary in the production of most branded attributes and, as a result, the opportunity costs incurred by cow-calf producers could be an important limitation to program development.

6.3.3 Opportunities

Although challenges remain to improving coordination in the beef industry, several opportunities exist to lower transaction costs and facilitate improved coordination. For example, cow-calf producers have been encouraged to retain ownership of their calves. This allows increased transparency and reduces information and negotiation costs. Alliances have provided financing incentives for retained ownership and often facilitate feedlots sharing ownership of calves to reduce the capital commitment required.

Improved industry infrastructure also lowers transaction costs. Certification institutions implement standardized procedures that reduce the monitoring costs of producing credence attributes. Quality assurance programs also implement standardized procedures to increase the quality and consistency of products, with the key attribute being tenderness. The creation of certification institutions for credence attributes and quality assurance programs facilitates coordination, while minimizing the associated transaction costs. To date, the presence of such institutions in Canada has been minimal and this is an important area for further development.

The mandatory individual animal identification program in Canada was implemented to trace cattle, but is being looked at carefully as a method to tie individual animal identification with information systems that could transfer detailed production and quality information throughout the supply chain. The development of other technologies, such as comprehensive information management systems, electronic identification, and computer vision scanning (CVS), could also facilitate the reduction of information and monitoring costs while improving coordination within the beef industry.

6.4 Further Research

There are a number of potential extensions to this research. The importance of additional transaction characteristics to cow-calf producers and the trade-offs they are willing to make could be evaluated with extensions to the conjoint analysis discussed in section four. Additional factors include other benefits in addition to premiums (i.e. market access, carcass quality/production information, reduced market fluctuations). Participant commitment requirements (i.e. membership fees, purchase of shares, annual/long term contracts) would also be of interest in understanding the trade-offs cow-calf producers are willing to make between the benefits received and program requirements. Additional asset specific investments could also be included. Preferences between different grid-based pricing systems could be examined in more detail to better understand the trade-offs producers make between receiving more quality information but facing increased price uncertainty.

The research could also be broadened to encompass a broader range of alliances and cow-calf producers in Canada. The sample size and location was limited in this study. Greater focus on the beef industry in Alberta and Ontario would be of particular interest given that these two provinces are the largest beef producing regions in Canada.

There are many questions about the retailer/processor interface that deserve closer attention. The retailing sector has changed substantially in the last decade and continues to evolve. It has a significant impact on how beef products are presented to consumers and the types of supply chain relationships that are expected to emerge. The interaction between retailers and other supply chain participants is poorly understood. The role of tracking and tracing technologies in delivering retail-level quality assurances is an important question.

Industry infrastructure, including grid-based pricing systems, information systems, ID technologies, and certification/quality assurance institutions have the potential to lower transaction costs and facilitate increased information flow along the supply chain. The extent to which these different technologies and institutions can reduce transaction costs, while facilitating improved coordination, bears further investigation.

The beef industry plays a significant role in Canadian agriculture. However, its growth is increasingly dependent on the production of differentiated beef products that

match consumer preferences. The industry needs to strengthen coordination to improve the transfer of information regarding consumer preferences and product quality along the supply chain. Improved coordination also facilitates credible quality assurances. The importance of different transaction characteristics to firms in the beef industry is critical in this regard. It is also important to understand the trade-offs supply chain participants are willing to make between the benefits received from improved coordination and the transaction costs arising when producing different beef attributes. The trade-offs will affect the optimal method of coordination for branded beef products. This research has taken a first step toward understanding how transaction characteristics affect supply chain coordination in the beef industry, and in identifying critical success factors and challenges to improved coordination in the future.

7. TECHNICAL APPENDIX: CONJOINT ANALYSIS

7.1 Specifying the Form of the Basic Model

This study uses an additive model, where respondents are assumed to obtain an overall preference or utility rating by implicitly adding the part-worth values for different characteristic levels in a scenario. Part-worth values are the utility (preference) scores for each characteristic level. They are analogous to regression coefficients, with the dependent variable in the conjoint model being total utility, and the part-worth values for different characteristic levels being the independent variables. (Ness and Gerhardy, 1994).

The additive part-worth model assumes that the part-worth of each characteristic level is independent of other characteristic levels and as such a respondent's preference for a particular beef program can be defined as sum of the different levels of transaction characteristics. The underlying model is therefore:

$$\begin{aligned} \text{Preference of program} = & \text{part-worth of level } i \text{ for transaction characteristic 1} + \\ & \text{part-worth of level } j \text{ for transaction characteristic 2} + \\ & \text{part-worth of level } k \text{ for transaction characteristic 3} + \\ & \text{part-worth of level } l \text{ for transaction characteristic 4} \end{aligned}$$

7.2 Designing Program Scenarios

Once the different characteristic and characteristic levels have been defined and a model form has been chosen, hypothetical beef program scenarios were created. The number of possible scenarios depends on the number of characteristics and the number of characteristic levels. The total number of scenarios in a full factorial design is equal to the product of the number of levels associated with each characteristic. In this case, this would give rise to 144 different scenarios ($4 \times 3 \times 3 \times 4$). Clearly it would be impossible for survey respondents to evaluate this many scenarios. Instead, a fractional factorial design was created allowing a selection of scenarios that capture the main interaction effects between the characteristic levels. In this manner, sixteen hypothetical program scenarios were designed.

In addition, two holdout scenarios were generated in order to check the reproducibility of the model. Holdout scenarios are rated by respondents, but the data obtained is not used in the computation of the part-worth values for the model. The holdout scenarios are instead used to test the validity of the conjoint model by comparing each individual's preference score for the holdout scenarios with the individual's actual preference scores (Hobbs, 1996b)

7.3 Sample Statistics

Table A1 - Comparison of Sample and Canadian Census of Agriculture Data

	Percentage in Category	
	Census of Agriculture (2001)	Cow-calf producer Survey
Gross Revenues ('000's)		
0-10	21%	6%
10-49	29%	11%
50-99	14%	16%
100-249	20%	30%
250-499	10%	23%
500+	6%	14%
Farm Income Sources		
Other Farm Income	No Comparable Data Available	60%
Backgrounding Feedlot		48%
Finishing Feedlot		15%
No Other Farm Income		19%
Alliance Participation		
Yes	No Comparable Data Available	15%
No		85%
Herd Size		
0-50	Avg. Canadian Herd Size: 53 Head Avg. Western Canadian Herd Size: 67 head	20%
50-100		18%
100-150		20%
150-200		21%
200-300		10%
300+		11%
Education		
Less than Grade 9	14%	0%
Grade 9 – 12	48%	29%
Post Secondary (Non- University)	27%	51%
Post Secondary (University)	11%	20%
Farm Operator Age		
Less than 35	11.5%	35%
35-60	53.6%	62%
60+	34.9%	3%

Source: Adapted from Statistics Canada Internet Site (2003)

7.4 Conjoint Results – Reliability and Validity

A dummy variable model was used to estimate the different part-worth values for each different characteristic level, as follows:

$$U = \beta_0 + \beta_1 I_1 + \beta_2 I_2 + \beta_3 I_3 + \beta_4 I_4 + \beta_5 P_1 + \beta_6 P_2 + \beta_7 P_3 + \beta_8 N_1 + \beta_9 N_2 + \beta_{10} N_3 + \beta_{11} M_1 + \beta_{12} M_2 + \beta_{13} M_3 + \beta_{14} M_4 + \mu$$

Where:

U = total utility (i.e. the total value that a respondent receives)

β_0 = constant

β_i = part-worth values. Where $i = 1 \dots 14$

$I_i = 1$ if level i of Investment is present, 0 if not present. $i = 1 \dots 4$

$P_j = 1$ if level j Pricing Method is present, 0 if not present. $j = 1 \dots 3$

$N_k = 1$ if level k of Number of Buyers is present, 0 if not present. $k = 1 \dots 3$

$M_l = 1$ if level l of Expected Premium is present, 0 if not present. $l = 1 \dots 4$

μ = error term

The importance scores reported in section four are derived from the part-worth estimates. The hold-out profiles determine the accuracy and validity of the calculations through calculation of the Kendall's tau and Pearsons' R statistics (SPSS Inc., 1997). The Kendall's Tau statistic measures the degree of correlation between the observed and estimated preferences and confirms the validity of the model. The Pearson's R statistic measures how well the model was able to predict the respondent's preferences by comparing how the respondent rated the hold-out profiles with the ratings predicted by the model. A good model fit is signified by statistics that are close to 1.00 (Hobbs, 1996b). The Pearson's R statistic for the model was .994, indicating that the model is highly accurate in predicting respondents' preferences for the hold-out profiles. The Kendall's Tau coefficient was calculated both for the 16 program profiles and the 2 hold-out profiles and were .950 and 1.0 respectively, indicating a high degree of correlation between the observed and estimated preferences.

Using the SPSS conjoint software, part-worth values for each characteristic level were estimated (i.e. the β_i 's in the estimated equation). These part-worth values are generated using a set of regressions on the ratings of the sixteen program profiles. The part-worth values (reported in Table 10) are expressed in a common unit and as such they can be added together to provide insights into the total value of a particular program scenarios. Importance scores are then derived by taking the utility range for a particular characteristic and dividing it by the sum of all the utility ranges (SPSS Inc., 1997). The importance values for all characteristics sum to 100% for each individual respondent

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