

University of Alberta

The Effects of a Quality Grading System on the Development of Consumer Driven
Best Practice Value Chains:
The Example of Meat Standards Australia

by

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Abstract

This research project analyzes the beef grading system in Australia. Firstly, the Meat Standards Australia (MSA) grading system as a potential value-creating and value chain-coordinating mechanism is investigated. In-depth interviews with value chain stakeholders and industry experts suggest that the implementation of the MSA grading system has had a catalytic effect of moving value chains toward a greater level of coordination. The concept of best value supply chains is also used as a benchmark in determining MSA's effect on value chain performance.

Secondly, using a survey of Australian consumers, findings suggest that the MSA certification is perceived as a trustworthy signal for tenderness and quality, reducing information asymmetry at the consumer level. This thesis then addresses the questions of whether or not it is necessary to use a grading system in consumer marketing (e.g. quality label) in order to be successful in terms of adding value to the industry.

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Chapter One: Introduction

1.1 Introduction

Over the past decade, declining consumer satisfaction and decreasing demand for commodity beef products have triggered the development of more integrated and vertically linked value chains. One response to decreased consumer satisfaction is the implementation of the Meat Standards Australia (MSA) grading system, which represents the best existing example of a total quality management grading approach for improving beef quality and palatability (Smith et al., 2008). Original literature on value chains dates back to Porter (1985) and Porter and Fuller (1986), with many fundamental advances since then. However, the empirical evidence on economic factors that drive value chain performance and determine adoption levels of the grading system in emerging chains is still scarce. More specifically, it appears that an empirical analysis which explores the effects of a grading system as part of a system-wide information sharing system on supply chain development is entirely missing.

In addition, there also appears to be a gap in the literature on the effectiveness of the MSA grading system at the consumer level. An understanding of consumer response to meat graded under the grading system and their perceptions of the system's labelling scheme as a trustworthy source for reducing information asymmetry at the consumer level is missing in the literature. Analyses of labelling issues associated with agricultural and agri-

food products are frequently done to address information asymmetries. Fresh meat is particularly vulnerable to information asymmetries, and as a result beef value chains have turned to both private and public labelling schemes in an attempt to communicate to consumers important quality attributes about beef, such as quality and tenderness.

1.2 Background Information

Declining per capita beef consumption has been identified as a major concern to the Australian beef industry (Griffith et al., 2010; Bindon and Jones, 2001). This trend is not unique to the Australian beef industry, and has been witnessed in other parts of the world, including North America (Ferrier and Lamb, 2006; Purcell, 1989; Schroeder et al., 1998). Contributing factors include variability in eating quality (e.g. tenderness and palatability), concerns regarding health risks, declining knowledge of cuts and cooking method, product appearance failed to identify quality, consumers demanding convenience, and competing products outpacing beef in terms of innovation and performance (Griffith et al., 2009; Brocklebank et al., 2008; Ferrier and Lamb, 2007). Modern meat consumers are demanding an increasing variety and quality of product and process attributes (Loureiro and Umberger, 2003; Umberger et al., 2003). More discriminating consumers asking for branded and differentiated products have forced former commodity meat supply chains to focus on quality signals.

Beef supply chains typically lack the necessary coordination to achieve the goals of quality and consistency (Brocklebank et al., 2008). Many supply chains in the beef industry are set up to deal with traditional commodity production, without the cooperation and integration that facilitates assurances of differentiated production. A well-designed and executed grading system can not only provide advantages to consumers, but potentially to all members along the value chain. Consumers can benefit from improved product consistencies and may thus reduce their declining meat consumption. Through integration a grading system can be

used in, or even form the foundation of, a total quality management system in order to control for quality. As a result of greater consumer confidence, all members along the value chain can potentially benefit from improved pricing signals, increased market share, and profitability.

1.3 Economic Problem

To explain increasing vertical coordination and integration much of the economic literature has focused on transaction costs and principle agent theory that are involved if firms were to continue to rely on the marketplace. A number of economic theories try to explain why value chain relationships evolve or fail to evolve. Transaction cost theory relates to choosing the most efficient level of integration in an attempt to minimize costs from opportunistic behaviour (holdup), recognizing that firms operate in an environment of incomplete and asymmetric information (Williamson, 1985; Frank and Henderson, 1992). Thus, transaction costs not only include negotiation, contracting, monitoring, enforcement, and dispute resolution costs, but also information costs (Nelson, 1970; Richardson, 1972; Williamson, 1985; Martinez et al., 2006; Hocomb and Hitt, 2007). Information costs appear to be particularly important in the context of beef value chains due to inherent information asymmetries with fresh meat (Martinez et al., 2006; Schulze et al., 2007). The costs related to measuring quality and identifying buyers and sellers in the marketplace can be significant in the meat and livestock industry, since many attributes are difficult to measure both ante mortem and post mortem.

At the consumer end of the chain, analyses of labelling issues associated with agricultural and agri-food products are frequently done to address information asymmetries (Caswell and Padberg, 1992; Caswell, 1998; Golan et al., 2000). Due to several experience and credence attributes

characteristics, fresh meat is vulnerable to information asymmetries between producers and meat consumers, which can lead to higher transactions costs in meat marketing. As a result beef value chains have turned to both private and public labelling schemes in an attempt to communicate to consumers important quality attributes about beef, such as production attributes and tenderness (Morales et al., 2009; Martinez et al., 2007; Ferrier and Lamb, 2007). But in order for labelling to be an effective marketing tool, quality labels and the certifying entities behind them must be perceived as being credible by the end consumer.

1.4 Research Objectives

The research objective of this thesis is to analyze the role of quality grading systems as coordination and integration mechanisms in beef value chains as well as their role as a consumer quality signalling tool. In order to do so this thesis investigates whether the increased information flow (between value chain members, and between the end retailer and the consumer) reduces information asymmetries, thereby contributing to overall value creation. To help address these overarching objectives that this thesis sets out to address, the following eight guiding hypotheses are explored as they relate to the effect that a grading system, such as Meat Standards Australia, as part of a total quality management system, can have on the Australian beef industry:

1. Best Value Supply Chain: Chains that adopt MSA will enhance their performance by being better positioned to deliver superior total value to the customer in terms of speed, cost, quality and flexibility.
2. Coordination: MSA is a catalyst for increased coordination through providing a platform for increased mutual decision making, cost sharing, sharing of MSA premiums, and profits.
3. Information: It is anticipated that the emergence of new forms of inter-organizational relationships and new technologies enable the emergence of more integrated supply chains (Handfield and Nichols, 1999), with subsequent increase in value chain performance.

4. Trust: MSA contributes to overcoming the disincentives of sharing individual profit opportunities, which are often a result of information asymmetries, resulting in asymmetrically distributed benefits in value chains.
5. Meat Standards Australia was developed in order to address two key problems: a reduced level of cut and cooking knowledge among consumers, and a high degree of variability among beef available to consumers (Griffith et al., 2010; Griffith et al., 2009; Rodgers et al., 2007; Yann et al., 1993). It is hypothesized that after experiencing MSA labelled beef, consumers will have higher confidence in their ability to select the appropriate product, and have a decreased concern about the variability among beef available.
6. To date there has been very little research conducted using consumer studies to directly analyse the credibility of, or consumer perception of, MSA or MLA. The research in this thesis addresses whether or not the MSA certification label is viewed as a trustworthy certification, as perceived by consumers.
7. The level of consumer heterogeneity in the Australian beef market implies that information is likely to be effective only when it addresses specific

information needs and is strategically positioned for its target audience (Morales et al., 2009; Erikson et al., 1998; Verbeke, 2005; Killinger et al., 2004). For this reason, this research looks at how consumer awareness and purchasing behaviours differ between the numerous socio-demographic characteristics within the sample population.

8. Discussions with experts on the Australian beef industry commonly raised the debate on whether or not grading systems are more effective when used as a consumer marketing tool (e.g. quality label), or simply as a system to underpin private brands. This research addresses whether or not a quality label like the MSA certification label is required to be displayed at the consumer level in order to have success in the retail sector.

1.5 Thesis Structure

This thesis is written in four distinct parts. The first part (chapter two) is designed to develop a fundamental understanding of the economic issues surrounding the process of integration and chain collaboration, the drivers behind chain collaboration, and developments in the literature on supply chain evolution. In addition, it also develops an understanding of current systems (public and private) that can influence a firm's ability to meet the needs of collective customers in the meat industry. All of these issues provide the economic foundation for which this thesis is written.

Chapter three provides an overview of the Australian and Canadian meat and livestock industries for beef cattle. Since this thesis analyzes individual companies within the Australian meat and livestock industry, and the value chains in which they operate, an understanding of the industry they operate in is imperative. One of the objectives of this thesis is to transpose the lessons learned from conducting research in Australia to potential best practices within the Canadian meat and livestock industry. In order to apply such lessons, this chapter then compares and contrasts the Australian and Canadian industries.

Chapter four analyzes economic factors that affect the creation and development of customer-driven value chains in the Australian beef sector, as perceived by industry stakeholders. The MSA grading system is investigated as a potential value-creating and value chain-coordinating mechanism. A

case study approach is used to explore differences in value chain performance based on differential adoption levels of MSA grading standards. In-depth interviews with five value chain stakeholders and industry experts suggest that the implementation of the MSA grading system has had a catalytic effect of moving value chains toward a greater level of coordination.

Chapter five utilizes an online consumer survey in order to analyze consumer perceptions of the MSA grading system. The research conducted through the use of the online survey finds that consumers perceive the MSA label to be a trustworthy certification. In addition, the MSA label ranked the highest when consumers were asked which beef certifications are more tender and second highest when asked which certifications are guaranteed to be better quality. This chapter thus concludes that the MSA certification is perceived as a signal for tenderness and quality. Lastly, this chapter helped to address a further gap; whether or not it is necessary to display a grading system as a certification in the consumer market (e.g. quality label) in order to be effective, or is managing an effective control system that is scientifically proven to have a higher correlation to eating quality than other grading systems, along the whole value chain sufficient for success. This thesis finds that a trustworthy (credible) third party label is helpful, but by no means a necessary condition for a successful grading system.

Chapter six provides a discussion and conclusion on the overall thesis findings. For example, this thesis emphasizes that a consumer oriented

approach in designing a grading system can benefit not only the consumer but also members along the value chain.

Chapter Two: Literature Review

2.1 Supply Chain Economics

This thesis looks at companies of varying vertical integration and degree of collaboration with chain partners. It is therefore important to develop a fundamental understanding of the literature that has dealt with principles of economic problems in regard to the firm, supply chains, and value chains. There are a number of economic theories that help to explain why supply chain relationships evolve or fail to evolve. This section develops a few of the more commonly cited economic theories in the supply chain literature and outlines how they influence supply chain relationships. To explain the increasing vertical coordination and integration in meat chains, much of the early literature has focused on transaction cost theory, principle agent theory, and the holdup problem.

2.1.1 Transaction Cost Theory

Transaction cost theory relates to choosing the most efficient level of integration in an attempt to minimize costs from opportunistic behaviour (holdup), recognizing that firms operate in an environment of incomplete and asymmetric information (Williamson, 1985; Frank and Henderson, 1992). Transaction cost theory is the most widely used approach for explaining the level of vertical integration and was the first to systematically describe and evaluate the diverse spectrum of alternative governance mechanisms, taking into account factors such as degree of asset specificity and uncertainty (Williamson, 1985; Schulze et al., 2007). Transaction costs not only include negotiation, contracting, monitoring,

enforcement, and dispute resolution costs, but also information costs (Nelson, 1970; Richardson, 1972; Williamson, 1985; Martinez et al., 2006; Hocomb and Hitt, 2007), an aspect that has been found to be particularly important in the context of beef value chains due to inherent information asymmetries with fresh meat (Martinez et al., 2006; Schulze et al., 2007). Information, or search costs, take place *ex ante* a transaction, negotiation and contracting costs take place during the transaction, while monitoring, enforcement, and dispute resolution costs take place *ex post* the transaction (Hobbs, 1996).

Transaction cost theory has also been the most commonly used theoretical framework for explaining contractual and vertical integration in livestock production (Schulze et al., 2007). The agricultural industry has long been dominated by independent, small scale family based firms, which imposes high transaction costs on the construction of value chains because commitment, flexibility, information flow and organizational structure have to be adapted to many heterogeneous partners (Enneking, 2004). The costs related to measuring quality and identifying buyers and sellers in the marketplace can be significant in the meat and livestock industry, since many attributes are difficult to measure both *ante mortem* and *post mortem*. Minimization of transactions costs depends on the ownership and governance structure within a given value chain. Transaction cost theory suggests that vertical integration may be a means to reduce information costs (Williamson, 1985; Whinston, 2003).

2.1.2 Principle Agent Theory

Principle agent theory is another economic theory that is commonly cited in organization theory and supply chain literature. “*Broadly speaking, cooperative behaviour between the principal and agent is viewed as a contracting problem between self-interested individuals with different goals and risk preferences*” (Martinez et al., 2006, p. 8). “*...Agency theory is directed at the ubiquitous agency relationship, in which one party [the principle] delegates work to another [the agent]*” (Eisenhardt, 1989a, p. 58). Considering different firms in the value chain as principals and agents, their interaction can be characterized through a structure of incentives and delegation (Jensen and Meckling, 1976; Eisenhardt, 1985; Eisenhardt, 1989a; Lawrence et al., 2001; MacDonald et al., 2004). This becomes relevant in the supply chain literature when firms delegate authority to another firm; typically this is observed when a chain captain allows others to act on its behalf. In this case, the participants are forced to choose between a course of action that benefits their own firm versus one that benefits the chain as a whole (Ketchen and Hult, 2007). This can occur when the desires or goals of the principal and agent conflict and it is difficult or expensive for the principal to verify the agents actions (Eisenhardt, 1989a). Such arguments are built on earlier work on the concepts of moral hazard and adverse selection (Aderlof, 1970).

In addition to differences in objectives, a second necessary condition is that there must be hidden action (adverse selection) or hidden information (moral hazard) (Besanko et al., 2010). Stated differently, even if all chain members have similar quality-related goals, the difficulty to verify an agent’s action in the chain

likely creates incentives for non-performance, particularly in cases where qualities are difficult to observe (e.g. tenderness) or in cases where efforts are difficult to observe (e.g. in the case of retained ownership of a cow-calf operation into a feedlot, where certain efforts of the feedlot operator may be unobservable to the cow-calf producer). *“When the principal has information to verify agent behaviour, the agent is more likely to behave in the interests of the principal”* (Eisenhardt, 1989a, p. 60). Suggested solutions in the beef industry have been to reward the producer based on the product produced (e.g. grid pricing), or the processor may invest in information about producer behaviour, such as documents to justify behaviour (Martinez et al., 2006). In such cases, an information-sharing system that improves the verification ability of the value chain captain, and/or the leadership component of that value chain captain likely improves coordination and chain performance. This thesis later points out that the increased information flow required by the MSA system has the ability to increase the principal’s knowledge of the agent’s behaviour, and thus increase overall value within a value chain.

2.1.3 The Holdup Problem

The holdup problem, as it relates to this thesis, arises when a party in a contractual relationship exploits the other party’s vulnerability due to relationship specific assets (Williamson, 1985). *“The literature on holdup originated with transaction cost theory and its objective of explaining the organization of firms. More recently however, the more formal incomplete contract theory, also known as property rights theory, has received considerable attention”* (Vukina and Leegomonchai, 2006, p. 590). For example, if one party invested in relationship

specific assets, its trading partner could attempt to renegotiate contractual terms, renege on the original deal. A relationship specific asset is an asset that is intended to support a specific purpose, in which the second best use for the asset produces a substantially less return compared to the return from the intended use. The holdup problem raises the cost of transacting arm's length market exchanges, and can lead to more difficult contract negotiations, investments to improve ex post bargaining positions, distrust, and reduced investment in relation specific investments (Besanko et al., 2010).

For example, suppose one or both parties of a potential transaction are required to invest in relation specific assets prior to engaging in a future transaction (e.g. specific technology used in a beef grading process). If either party anticipates the possibility of being vulnerable to the holdup problem, the initial contract negotiations are likely to be very time consuming and costly, as each party attempts to protect itself from potential future holdups (Besanko et al., 2010). Such transactions costs can affect decisions to integrate (impact the buy / make decision). More specifically, governance structure of transactions can depend on the degree of asset specificity, uncertainty level, and frequency level of the considered transactions (Williamson, 1985; Banterle et al., 2006). The degree of these three factors along with the relative cost of obtaining information, negotiating and monitoring determines a consequent governance transaction arrangement (Banterle et al., 2006). *“Without vertical integration between buyer and supplier, the rational supplier will be reluctant to invest in the first place*

because of the fear of opportunistic behaviour by the buyer” (Vukina and Leegomonchai, 2006, p. 591).

Armour and Teece (1980) note three reasons for a relationship between vertical integration and innovation. Firstly, vertical integration circumvents the holdup problem as firms are more willing to undertake specific investments in innovation when they do not have to worry about being “held up”. Secondly, vertical integration can better facilitate the implementation of innovation if it is required to take place downstream or upstream in the production process under the same ownership. Lastly, vertical integration may facilitate the alignment of objectives between the various stages of the innovation and development process (Karantininis et al., 2010). Schulze et al. (2007) argue that the introduction of new institutions, such as those quality certifications further examined in this thesis, have the ability to reduce the necessity of contractual arrangements between farmers and processors and supports a more flexible market structure. Karantininis et al. (2010) also find that firms which indicated that they have some degree of vertical integration tend to innovate more – a theme central to this thesis. This thesis considers whether or not supply chain members, investing in technology to improve their grading process, are vulnerable (or perceive to be vulnerable) to being held up ex post investment.

2.1.4 Recent Advances in the Supply Chain Literature

It is clear that the above economic theories (transaction cost theory, principle agent theory, and the holdup problem) provide the core foundation of

supply chain literature, specifically in regard to governance structure. However, the literature has evolved and has been expanded upon in recent years. Such literature is developed in this section. Without downplaying the unique characteristics of agriculture (e.g. length of production cycles, weather risks, perishable products, etc) that must be considered when understanding and designing supply chains (and thus value chains), fundamental supply chain literature (e.g. Porter, 1985) can be applied.

The concept of value chain, as initially proposed by Porter (1985), depicts the firm as a collection of discrete, value creating activities, such as finance and accounting, human resources management, technology development, and procurement. Original literature on coordination includes Porter and Fuller (1986) who mention four benefits from cooperation. These include achieving economies of scale, obtaining access to the benefits of other firms' technology, markets, means of production, and special skills, reducing risk by sharing investments such as research and development, and to speed up reaching the market. Some of these benefits lead to reduced cost, others to product/process differentiation, and some to both reduced cost and differentiation.

The literature has since evolved from basic coordination and formation of governance structure, to a supply chain focus, and then to value chain concepts. Hanfield and Nichols (1999) define the supply chain as encompassing all activities associated with the flow and transformation of goods from the raw materials stage, through to the end user, as well as the associated information flows. Whereas, more recent literature on value chains (building on Porter, 1985) suggests a value

chain is an alliance of enterprises collaborating vertically to achieve a more rewarding position in the market (Agriculture and Food Council of Alberta, 2004). Recent value chain literature distinguishes value chains from supply chains in the following ways: more communication, value/quality focused (versus cost/price focused), differentiated product (versus commodity), demand pull relationship (versus supply push), interdependent organizational structure (versus independent), and have a philosophy of chain optimization (versus self optimization).

Ketchen and Hult (2007) and later Ketchen et al. (2008) further develop the value chain concept through defining best value supply chains (BVSCs). Ketchen and Hult (2007) outline that best value supply chains use strategic supply chain management as a strategic weapon, in contrast to traditional chains that view supply chain management as a method to move products in order to support strategy. Best value supply chains are thought to be more agile, adaptive, and aligned, and ultimately are able to compete in total value across speed, quality, cost, and flexibility, in contrast to traditional supply chains that would typically focus on one of these four competitive priorities (Ketchen and Hult, 2007). Best value supply chains are thus most likely to prosper within today's competitive global landscape (Ketchen and Hult, 2007). Section 4.2.1 further explores the evolution in organizational literature toward best value supply chains.

Beef supply chains typically lack the necessary coordination to achieve the goals of quality and consistency (Brocklebank et al., 2008). Many supply chains in the beef industry are set up to handle traditional commodity production, without

the cooperation and integration that facilitates assurances of differentiated production. Without proper integration and information sharing, combined with the current co-mingling that occurs with bulk handling in commodity agriculture systems means that demand for specific attributes cannot be sent from consumers down through the supply chain (Brocklebank et al., 2008; Hayes et al., 2003). However, increased coordination in the beef industry has been characterized by a movement from the traditional spot market system toward alternative marketing structures, including production and marketing contracts, strategic alliances, and vertical integration (Brocklebank et al., 2008). Reasons for the industry being slow to move toward greater integration, when compared to other agri-food industries, include, among other reasons, large number of industry stages and high management and monitoring costs of the cow-calf production stage (Ward, 2001; Brocklebank et al., 2008).

2.2 Drivers of Cooperation

With increased globalization and liberalization of trade markets, beef and cattle markets are becoming increasingly competitive. Consumers on the global market are also becoming more demanding. There are two primary ways that countries can remain competitive in their product offering: The traditional approach being through price as a result of cost reduction. Alternatively, if a particular country can convince international buyers that their food safety and quality system has a higher degree of integrity in comparison to its competitors then that particular country can create a source of competitive advantage via product differentiation (Spriggs and Isacc, 2001). In order to differentiate a

product on a national basis all players must move in the same direction with a focus on the same goals (Schroeder, 2003). In addition to globalization of trade markets and strengthening of quality and safety standards and demands, all industries have also witnessed significant advances in technology (including information technology). As a result of these changes firms find that they can no longer remain competitive by simply managing their own organization with a 'silo' mentality. They must be involved in the management of the network of all upstream and downstream firms (Handfield and Nichols, 1999). In a more general context, Handfield and Nichols (1999) note that until recently organizations have focused primarily on their direct customer, placing relatively little emphasis on either other organizations within the supply chain network or the end customers. This is also evident in the beef sector, as “...*vertical coordination in the beef industry has been characterized by a movement away from the traditional spot market system toward these closer forms of coordination*” (Brocklebank and Hobbs, 2004, p. 3).

Van Roekel et al. (2002) suggest that partners wanting to participate on the global market collaborate through supply chains. They claim the three main market driving forces for supply chain partners to collaborate are for market segmentation (product differentiation), consumers' demand (satisfy the need for quality, safety, sustainability, health, and animal welfare), and to develop a low cost strategy. Similarly, Ondersteijn et al. (2006) mention three value proposition of a food supply chain network. First, is network differentiation and market segmentation where the target is to differentiate as a chain in order to meet the

specific demands of customers such as product quality or safety. The second value proposition is integrated quality. Here the target is to meet the increasing demand of not only consumers but also governments, non government organizations, and business partners for safe and environmentally friendly produced food products. Lastly, is network optimization where the target is simply cost reduction through a streamlined process supported through rational information.

Integrated chains can be an effective tool in helping to nationally deliver such products. The reward from becoming more integrated in a chain depends on the potential competitive advantage of the chain and of the competitive position of the individual firm within that chain. The participation rate can also be dependent on whether or not the state/country can properly communicate the advantages of value chains and thus programs such as traceability, or enhanced safety and quality (Ondersteijn et al., 2006).

2.3 National and International Drivers of Food Safety

Regardless of whether or not we rely on market forces or on institutional arrangements to ensure an adequate level of food safety, there will be drivers pushing for enhanced safety. Spriggs and Isaac (2001) divide drivers for change into two categories: national and international. National drivers are defined as drivers that are specific to the individual country's domestic market. National drivers can help to explain the differences in food safety systems between countries. Examples of national drivers include food contamination crisis (Spriggs and Isaac, 2001). International drivers are often summarized as the "market mega-

trends” that work to encourage higher standards of food safety in most developed countries. In contrast to national drivers, international drivers have a harmonizing effect on food safety systems between the respective international players. Those who fall behind will lose their international competitiveness. Spriggs and Isaac (2001) outline a number of demand side and supply side international drivers. On the demand side, consumer preferences are becoming more exacting as incomes continue to grow (Spriggs and Isaac, 2001). From this, there is an increasing awareness and willingness-to-pay for an assurance of food safety. As well, the globalization of news media allows for rapid dissemination of information of food crisis across international borders. On the supply side, technological improvements throughout the supply chain have allowed for and enhanced food safety procedures to extend along the chain providing a more integrated and advanced food safety system.

2.4 Institutional Arrangements

The most important institutional arrangements in developed countries include the World Trade Organization’s (WTO’s) Agreement on Sanitary and Phytosanitary Standards (SPS Agreement) and Agreement on Technical Barriers to Trade (TBT Agreement) as well as the Codex Alimentarius (Codex) (Organisation for Economic Co-operation and Development, 1999; Spriggs and Isaac, 2001). *“These arrangements help to standardize the rules for establishing domestic food safety regulations while simultaneously discouraging their use as an unwarranted barrier to trade”* (Spriggs and Isaac, 2001, p. 15). Of particular interest to this study is the Codex and its administration of Hazard Analysis

Critical Control Point (HACCP). *“The Codex Alimentarius Commission was created in 1963 by FAO and WHO to develop food standards, guidelines and related texts such as codes of practice under the Joint FAO/WHO Food Standards Programme. The main purposes of this Programme are protecting health of the consumers and ensuring fair trade practices in the food trade, and promoting coordination of all food standards work undertaken by international governmental and non-governmental organizations”*(Codex Alimentarius, 2010).

In 1993 the HACCP system was adopted by the Codex Alimentarius Commission (World Health Organization, 2009). The HACCP system has grown to become the universally recognized and accepted method of food safety assurance (World Health Organization, 2009). *“The HACCP system is a scientific, rational, and systematic approach to identification, assessment and control of hazards during production, processing, manufacturing, preparation and use of food to ensure that food is safe when consumed”* (World Trade Organization, 1997, p. 2). Some have claimed that the implementation of the HACCP system provides the meat industry with the best tool to manage food safety reliably and demonstrate how the quality of its raw material, its standards of hygiene and process control lead to safe and high quality products (Brown, 2000). It provides a cost effective and preventative approach to food safety through integration into the design of the process rather than focusing on testing of the end product as many other systems have done. The system is based on seven principles as follows: conduct a hazard analysis, determine critical control points for physical, biological, and chemical hazards, establish critical limits for preventative measures

associated with each critical control point, establish critical control point monitoring requirements, determine and perform corrective actions, establish record-keeping systems, and conduct verification procedures to confirm that the HACCP system is working effectively (Schmitz et al., 2002). In Canada, a complete HACCP system is mandatory for all federally registered meat processing establishments (Canadian Food Inspection Agency, 2010, Canadian Beef Export Federation, 2010). In Australia, all domestic meat processing plants were required to have in place a co-regulated HACCP system by January 1, 1997 (Spriggs and Isaac, 2001).

In addition to the quality of food products, consumers are taking a greater interest in how the products they consume are being produced (Loureiro and Umberger, 2003). Programs such as GLOBALGAP provide such assurances. *“The GLOBALGAP standard is primarily designed to reassure consumers about how food is produced on the farm by minimizing detrimental environmental impacts of farming operations, reducing the use of chemical inputs and ensuring a responsible approach to worker health and safety as well as animal welfare”* (GLOBALGAP, 2009). GLOBALGAP, the successor of EUREPGAP, was announced in September 2008. With a presence in more than eighty countries (including members within Canada and Australia), and in every continent, the system has established itself as a key reference for Good Agricultural Practices (GAP) in the global market place (GLOBALGAP, 2009).

2.5 Food Safety Trends – Who is Responsible

There has been much debate as to who is responsible for food safety. Schmitz et al. (2002) outline five common arguments for government involvement in the regulation of the agriculture and food industry. The first reason is that the unregulated market will not achieve the optimal level of food safety. In the literature this reason tends to be centered on the theory of asymmetric information. Market failures can occur when there is asymmetric information between the buyer and any level of the food supply chain (Akerlof, 1970; Nelson, 1970; Caswell and Mojduszka, 1996; Spriggs and Isaac, 2001). For example, the producer may have knowledge of credence attributes that are not known to the consumer. Similarly, the costs of a negative food safety incident are not fully internalized. As well, a firm may not be able to fully capture the benefits of providing safe food, and the level of food safety may be less than optimal if left to the market (Schmitz et al., 2002). Such an argument supports the need for institutional arrangements or a government structure that provides formal and informal rules to ensuring food safety. Secondly, governments become involved in the production process to ensure the safety of animals and the environment. Thirdly, regulation helps the consumer to determine the quality attributes of a product, allowing for a market to develop for higher quality products. Fourth, regulation may be necessary to protect from fraud. And lastly, regulation can be used to create trade barriers (Schmitz et al., 2002).

2.6 Quality Labelling

A number of the same arguments hold for mandatory labelling as noted in section 2.5. For example, an unregulated market where market incentives for private labels are the driving force may not achieve the optimal level of food quality. Government intervention in food labelling is often proposed with the aim of achieving a social goal such as improving human health and safety, mitigating environmental hazards, averting international trade disputes, supporting domestic agricultural and food manufacturing industries, and to correct for asymmetric information and to control for externalities (Golan et al., 2000).

Although not without debate, labelling is seen as an effective way to reduce information asymmetry through communicating certain attributes to the end consumer, due to their specific and direct impact on consumer decision-making (Rimal and Fletcher, 2003; Verbeke, 2005). Essentially, information labelling schemes have the ability to transform former experience attributes into search attributes, allowing the consumer to have confidence in their pre-purchase judgement (Caswell, 1998; Casswell and Mojduszka, 1996). Quality labels or private branding can be a way to signal to the consumer such attributes. Meixner et al. (2007) note that the use of labels is connected with several important advantages, including simplicity of usage, reduction of information, and traceability. Labels are extrinsic information cues that can assist consumers in inferring product quality or other attributes, and increased uncertainty and perceived difficulty to evaluate quality can increase the consumers' usage of such cues (Verbeke and Ward, 2006; Stranieri and Baterle, 2009; Verbeke and Roosen,

2009; Morales et al., 2009). *“Through their signal value and visibility on product packages – similar to the case with brands – such labels may reach the status of a search cue, ie., an information cue that consumers actively search for during their shopping and purchasing decision processes”* (Verbeke and Roosen, 2009, p. 22). Labels can thus decrease consumer information costs (Stranieri and Banterle, 2009; Verbeke and Roosen, 2009; Verbeke, 2005). And in cases where uncertainty about the quality or safety of a product is elevated, labelling information can become more dominant as a means to infer product quality (Verbeke and Roosen, 2009).

Ondersteijn et al. (2006) mention the two main motivations for creating private labels to be to create market power through increased market share, and ensuring food safety by gaining more influence in the production process. Private companies will have an interest in the use of voluntary labels as a means of differentiating their products to consumers (Caswell, 1998). For example, incentives are greater for private companies to adopt best practices to ensuring tenderness, and labelling as such. But in order to be effective, labels and the sources behind them must be perceived as being credible by the users. Hence, not only the information provided but also the source providing the information must be trusted by the consumer (Eden et al., 2008). This argument dates back to Akerlof’s (1970) lemons problem. Akerlof (1970) notes that numerous institutions arise to counteract the effects of quality uncertainty. For this reason, private firms often adopt recognized standards such as the Meat Standards Australia grading system or standards developed by the Canadian Beef Grading Agency. Chapter

five provides a greater level of detail on private and public labelling as well as empirical work on quality labels.

2.7 Food Quality and Grading

Because many studies have found that consumers are willing to pay for quality beef products (and discount a low quality product) overall product quality is important to the competitiveness of the beef industry. Figure 5.1 (see p. 140) provides a list of studies evaluating consumers' willingness-to-pay for beef tenderness, for example. For this reason the topic of quality grading systems in the beef industry certainly deserves consideration. A grading system can not only provide advantages to consumers, but potentially to all members along the value chain. Consumers can benefit from improved product consistencies and may thus reduce their declining meat consumption to a lesser extent. Companies forming value chains can use a well designed grading system as a strategic weapon. When combined with a proper communication tool (e.g. certification label), grades become a quality signal for both consumers and value chain members (Lusk et al., 1999; Ferrier and Lamb, 2006; Caswell and Mojduszka, 1996). Through integration a grading system can be used in, or even form the foundation of, a total quality management system in order to control for quality. For example, a number of companies in Australia have used the MSA grading system as a farm management tool, as a quality assurance system, and as a marketing advantage in both the retail and wholesale markets (Griffith et al., 2010). As a result of greater consumer confidence, all members along the value chain can potentially benefit from improved pricing signals, increased market share, and profitability. In order

to be successful the supply chain must respond to such market signals from the consumer end. Therefore, it is necessary to develop production specifications in reverse order (Rutley, 2005), using a consumer approach. With proper information flow, pricing signals, and of course trusting relationships, a fully integrated value chain can produce consistent tenderness. For example, producers can be compensated by the processor for producing animals with attributes that consumers desire and are willing to pay for. Such compensation can encourage the adoption of technologies including quantitative genetics, reproductive technology, and innovative management, as an example (Rutley, 2005).

A critical problem with beef markets (as with a number of other food markets) is that asymmetric information exists between buyers and sellers regarding product quality (e.g. tenderness, eating quality) (Ferrier and Lamb, 2007). Unless information on such attributes (e.g. tenderness) can be effectively brought to the consumer, markets will be inefficient. Consumers unable to distinguish higher quality products from the lower quality products will resort to paying an average price, and value chain members producing a higher quality product will not receive the proper premium or price signals. This issue is commonly referred to in economic literature as the “lemons problem” (Akerlof, 1970). Akerlof (1970) illustrates the problem with the example of the used car market where car dealers have more information about the quality of cars than buyers do. In such a case good cars and bad cars can sell at the same price since it is impossible for the buyer to distinguish high and low used car qualities. Building from this fundamental economic theory, in order to be effective it is critical that

tenderness assurance schemes are able to provide a high predictability (reducing information asymmetry) of tenderness and thus consistently provide the consumer with a tender product. It is therefore obvious that consumers place a higher premium for tenderness when such claims are backed by a tenderness assurance (Schroeder et al., 2008). However, many current quality grading systems are poor predictors of beef product tenderness (Schroeder et al., 2008). Section 3.1.3 and 3.2.3 provide a more detailed discussion of the characteristics of the Australian and Canadian beef grading systems, respectively.

Many studies have found that consumers are willing to pay for a higher level of beef tenderness (beef tenderness is an attribute that consumers desire and seek) (Shackelford et al., 1999; Rodgers et al., 2007). Consumer willingness-to-pay for beef with a guaranteed tenderness attribute is consistent with hedonic pricing analysis, where the utility a consumer derives from a good depends on the attributes that the good embodies (Besanko et al., 2010). It is important to note that product grading systems are just as much about consistency as they are about quality; even a small proportion of tough product in meat product offerings can adversely impact the consumer's experience, and reduce consumer demand for beef (Schroeder et al., 2008). Through analysing the results of numerous past studies, Schroeder et al. (2008) find the amount a typical consumer (U.S.) is willing to pay for a tender relative to a tough steak is around \$1.84 per pound in the U.S.. In Australia, Griffith et al (2010) states "*...beef consumers have revealed through actual purchase decisions that they are willing to pay between 4 and 15*

percent more for MSA graded cuts than non graded cuts, or about \$0.30-0.40/kg on a retail carcass equivalent basis” (Griffith et al., 2010, p. 10).

2.8 Traceability

It is difficult to have a comprehensive discussion on the topics of food safety and food quality without an introduction to traceability. Several countries in the EU, Canada, the U.S., and Australia have implemented varying forms of traceability in their respective livestock industries (Trautman et al., 2008). Improving food safety and quality, reducing the impacts of food safety and quality, and providing a means to verify the safety and quality of food are key drivers in the development of traceability in agri-food industries (Ondersteijn et al., 2006). Ondersteijn et al. (2006) suggest the key functions of traceability to include allowing for efficient trace back of products and inputs in the event of a food safety or herd health problem, to reduce information costs for consumers by identifying credence attributes, and as a means of strengthening liability incentives to produce safe food. Others have noted the ability to identify sources of food hazards raises the question of liability, creating the incentive for agents to use safer production and processing methods (Souza-Monteiro and Caswell, 2004). Tonsor and Schroeder (2006) claim that concerns about animal health, potential bio-terrorism, food safety, international trade, consumer demand for credence attributes, and improving supply chain management are igniting unprecedented changes in international meat and livestock markets; mainly advancements of national animal identification programs. As a result, traceability has been pushing

closer integration among previously independent firms, initiated by pressures to control quality and safety and to monitor compliance.

Empirical results include Banterle et al. (2006), who find that after the introduction of a voluntary traceability scheme in Italian meat processing facilities, firms witness an increase in the degree of human, material and site asset specificity, and a reduction in the degree of uncertainty in transactions. However, they also found that such a system came with increased monitoring costs. Essentially, countries (and value chains) that can provide assurances of food safety and quality to domestic and export consumers through the use of traceability will put themselves at a competitive advantage in relation to the countries that either do not have adequate traceability systems or whose traceability systems are not perceived by consumers as being reliable.

Traceability alone does not contribute to safer or higher quality of food products (Souza-Monteiro and Caswell, 2004; Trautman et al., 2008). Traceability only allows a framework for information to transfer between the interfaces within a value chain. In order for traceability to be effective it must be integrated with a corresponding quality assurance mechanism that further imposes a set of standards and procedures (Souza-Monteiro and Caswell, 2004; Hobbs, 2003). Consistently, it is also important to note that traceability itself does not necessarily increase the value of a product to the consumer. Before adopting traceability systems it is necessary to understand both consumer willingness-to-pay and mandatory export regulations, as both will have an impact on profitability and market share. For example, where markets are either willing to pay a premium or traceability is

mandatory, adopters will receive either a premium or cost recovery, at the minimum. However, when exporting to markets where traceability is not required, countries could lose market share because it is likely that higher prices (due to cost recovery of implementing and executing traceability systems) will hurt their competitiveness in those markets (Souza-Monteiro and Caswell, 2004). A number of willingness-to-pay studies (e.g. Ondersteijn et al., 2006; Dickinson and Bailey, 2002; Hobbs, 2003) suggest that most of the value from traceability comes from the information that traceability systems can provide (assurances on animal treatments, food safety, food quality, etc), and not necessarily from basic traceability itself. In contrast, Souza-Monteiro and Caswell (2004) refer to a number of studies in North America that suggest consumer willingness-to-pay for traceability programs. But such studies show only small amounts, such as Hobbs (2002, 2003), demonstrating Canadian's willingness-to-pay a premium of less than 10% for traceability on a beef sandwich valued at \$2.50.

Traceability is becoming more prominent in beef markets, with animal identification schemes providing the core foundation. In beef industries the adoption of traceability along with regular testing of animals enables the respective authorities to identify the sources of potential animal or human health hazards in an attempt to limit the chances of a wider spread of diseases (Souza-Monteiro and Caswell, 2004). Section 3.1.4 and 3.2.4 provide an outline and comparison of the Australian and Canadian beef traceability systems, respectively. Meat Standards Australia is also presented as a quality assurance scheme with a

built in traceability system, with the objective of tracking tenderness attributes from farm to fork.

2.9 Economics of Information and its Role

A supply chain is fully coordinated when all decisions are aligned to accomplish the same goals and objectives (Sahin and Robinson, 2002). Information flows have a direct impact on many chain functions, including production scheduling, inventory control and delivery plans of individual members in the chain (Lee et al., 1997). The innovations in information technology, increasing customer demands in areas of product quality and safety, and the emergence of new forms of inter-organizational relationships have been a catalyst to allow for the emergence of an integrated supply chain approach. When partners choose to participate, information can cost effectively be available to any party within the chain. *“Point-of-sale data [can be] transferred immediately throughout the supply chain, allowing managers to spot trends, plan capacity requirements, allocate materials, and notify suppliers throughout the entire chain”* (Handfield and Nichols, 1999, p. 7). Essentially, each member must have the information that is required by the decision makers in each link to effectively make decisions that are in line with the mutual goals of the chain.

But lack of coordination can occur when decision makers have incomplete or inaccurate information, or incentives, that are not compatible with the overall objectives of the value chain. Often times decision makers have private information which they are not willing to share with other members of their value

chain, resulting in sub-optimal system performance (Sahin and Robinson, 2002). Lack of information sharing can lead to a supply chain's tendency to amplify, delay, and oscillate demand information – a phenomenon referred to as the bullwhip or whiplash effect (Forrester, 1958; Sahin and Robinson, 2002; Lee et al., 1997). Among other negative factors that result from a lack of information sharing is a distortion in demand information where a chain member (e.g. manufacturer) receives information only through orders placed by downstream players. Without full information sharing the manufacturer cannot fully understand the true demand for the product, resulting in the manufacturer incurring excess raw material cost due to unplanned purchases of supplies, additional manufacture expense created by excess capacity, inefficient utilization and overtime, excess warehousing expenses, and additional transportation costs due to inefficient scheduling and premium shipping rates (Lee et al., 1997). Further results of information asymmetries, specifically the vulnerability of information asymmetries in the fresh meat industry, are explored in section 5.2.

In order to provide such information, each member of the chain has to perceive that they will benefit at least as much from the information they receive than the cost and time required of them to provide their proprietary information to other members of the chain. In order to mitigate for hesitation to participate in open/full information sharing, chain members may resort to contracts ensuring coordination through appropriate provisions for information and incentives (Sahin and Robinson, 2002). Schroeder (2003) provides an outline of the desired categories of information that are necessary at each level within a beef value chain.

Cow-calf producers rely on seed stock suppliers to provide accurate and reliable information regarding breed, quality attributes, etc. Feedlot operators rely on information from the cow-calf operators in regard to preconditioning, vaccination programs, quality attributes, etc. And processors rely on information on cattle quality, and yield expectations. Information transfers are therefore necessary at every interface from producer to the end consumer. Note that the information does not only go one way. For example, information from feedlots regarding detailed feeding and slaughter performance allows the producer to make better decisions and attempt to produce desired attributes.

2.10 Trust in Chain Relationships and Labelling Claims

Trust is commonly cited in the literature as being critical to ensuring not only the effectiveness but also the survival of a supply chain (Zaheer et al., 1998; Holcomb and Hitt, 2007; Fischer, 2009). The presence of trust among firms has the ability to increase overall performance, decrease the complexity and costs of negotiation, and reduce conflict (Zaheer et al., 1998). Trust and information sharing can form a circle. Trust can be formed through open access to information sharing, while the willingness to participate in information sharing is a result of previous trust. A part of trust can be built through firms delivering the correct stock, in the correct quantity, at a price that is reasonable to both parties (Jie et al., 2007). Given trust is somewhat an abstract term it is difficult to measure and manage. Part of this difficulty comes from the fact that it is continuously evolving as culture changes in a company or an industry (Schulze et al., 2007). Organizational trust formed by repeat market exchanges is an important driver of

inter firm relationships (Zaheer et al., 1998). As the frequency of transactions increases there becomes a greater reliance on trust. It is in the best interest of participants who frequently engage in transactions to act honestly, not hide information, and not act opportunistically (Brocklebank, 2004). Such actions could harm future relationships. Fischer (2009) did a study on trust levels in the meat sector supplier-buyer relationships in six European countries in order to identify the main determinants of trust. In the farmer-processor relationship Fischer (2009) found that positive past collaboration, followed by effective communication and the existence of personal bonds were positive and significant factors affecting the level of trust. In processor-retailer relationships a positive past collaboration experience and effective communication were also positive and significant. The existence of personal bonds did not have a statistically significant influence on the observed trust levels. Brocklebank (2004) finds that an increased frequency of transactions within a beef alliances aids in creating trust based relationships and improving the flow of information to cow-calf operators.

However, the relationship among firms in beef supply chains is often competitive instead of cooperative (Brocklebank et al., 2008). Firms spend much effort attempting to increase their portion of the benefits arising from a tactical transaction relative to the efforts they put into increasing the benefits of the chain as a whole (Brocklebank et al., 2008). Schroeder (2003) also notes that too often in the beef industry information is withheld across vertical segments or interfaces because asymmetric information provides a platform for individual profit opportunities at the expense of someone else. Other studies have also found a lack

of cooperation and distrust in the beef industry in other parts of the world (e.g. United Kingdom - Palmer, 1996; Simmons et al., 2003; New Zealand - Clare et al., 2002; and Canada - Brocklebank, 2004).

Trust is not only a founding pillar of the supply chain literature, but is also important in the interface between the retailer and the consumer (Golan et al., 2000). In order to be effective, labels and the certifying entities behind them must be perceived as being credible by the users. Hence, not only the information provided but also the source providing the information must be trusted by the consumer (Eden et al., 2008). Chapter five explores further how third party certification schemes can be used to overcome the potential lack of trust prevalent with private certification schemes.

2.11 Conclusions

This literature review was intended to provide a background on the economic issues surrounding the process of integration and chain collaboration, the drivers behind chain collaboration, and developments in the literature on supply chain evolution. With increased globalization and liberalization of trade markets, beef and cattle markets are becoming increasingly competitive. Consumers on the global market are also becoming more demanding in the quality level and specific attributes they are demanding. Such demands have implications for value chains in terms of systems to guarantee quality and information. If a particular country can convince international buyers that their food safety and quality system has a higher degree of integrity in comparison to its competitors

then that particular country can create a source of competitive advantage via product differentiation (Spriggs and Isacc, 2001). This can be achieved through integrated supply chains, an effectively controlled and monitored grading system, and traceability that can track desired attributes for safety and quality.

Chapter Three: Comparing the Australian and Canadian Meat and Livestock Industries

3.1 Overview of the Australian Beef Industry

The meat and livestock industry is important to the Australian economy, with the off farm meat value (consumer expenditures plus export value) of the Australian beef industry estimated to be 12.1 billion dollars (Meat and Livestock Australia, 2009). The beef industry contributes 17% to total Australian farm exports, ranking it to be the most valuable farm export in the country, with a gross value of cattle and calf production being approximately 8 billion dollars (Meat and Livestock Australia, 2009). Australian meat production has been increasing over time (an increase of 65% from 1984-85 to 2008-09), leading the country to be the world's fifth largest producer with total production of 2.1 million tonnes of beef and veal in 2008 (Fletcher et al., 2009; agri benchmark, 2009). The meat processing sector employs more than 31,000 people across Australia and accounts for more than 1.4 billion dollars worth of wages and salaries (Fletcher et al., 2009). The top 25 processors in Australia account for approximately 77% of Australia's red meat production (Fletcher et al., 2009).

Australia's national herd of 25.3 million cattle ranks tenth in the world with respect to inventory size (agri benchmark, 2009), with inventory levels fluctuating with droughts, world grain prices, and cattle prices (Bindon and Jones, 2001). Forty-seven percent of the national herd is located in Queensland, and 22% of the herd is located in New South Wales (Fletcher et al., 2009). There are 61,925 properties with cattle, and 40,188 of these are specialised beef cattle

farming establishments (Fletcher et al., 2009, Meat and Livestock Australia, 2009). While corporate agricultural properties make up only two percent of specialized beef properties, corporate properties operate 34% of the land devoted to beef production and own 16% of the total beef cattle numbers (Bindon and Jones, 2001). Table 3.1 further explores the structure of beef farms in Australia.

Table 3.1 Distribution of Beef Cattle Farms, Australia

By Number of Cattle, at June 30

Average between 2001-02 and 2008-09

	Number of Farms	Share of Farms (%)	Share of Beef Cattle (%)	Share of Value of Cattle Sales (%)
Northern Australia				
less than 100	2,224	21.3	1	2
100-200 head	1,690	16.2	2	2
200-400 head	1,831	17.5	4	5
400-800 head	1,441	13.8	6	7
800-1600 head	1,462	14.0	13	13
1600-5400 head	1,397	13.4	30	30
more than 5400 head	404	3.9	43	41
Total	10,449	100	100	100

Southern Australia				
less than 100	9,793	32.9	6	7
100-200 head	7,066	23.8	12	11
200-400 head	6,543	22.0	21	18
400-800 head	4,385	14.7	27	23
800-1600 head	1,445	4.9	18	15
1600-5400 head	471	1.6	13	13
more than 5400 head	37	0.1	4	13
Total	29,739	100	100	100

Australia				
less than 100	12,017	29.9	3	4
100-200 head	8,755	21.8	6	7
200-400 head	8,374	20.8	11	12
400-800 head	5,826	14.5	15	15
800-1600 head	2,907	7.2	15	14
1600-5400 head	1,868	4.6	23	21
more than 5400 head	441	1.1	27	26
Total	40,188	100	100	100

Source: Australian Government, 2008.

Australian beef production is commonly split geographically into two regions and six zones. The two regions are the Northern and Southern Regions. Within each of these regions are the High Rainfall Zone, Temperate Zone, and Pastoral Zone. Of the total 219,700,786 hectares of the Australian beef area, the Northern Region occupies 72% of this area with 158,504,422 hectares (Australian Government, 2010a). Table 3.2 further explores the geographic concentration of the national beef herd.

Table 3.2 Geographic Concentration of Beef Area, Australia

Region	Area(ha)	% of Australian beef area
Northern Region	158,504,422	72
High Rainfall zone	6,634,626	3
Temperate zone	6,304,595	3
Pastoral zone	145,565,201	66
Southern Region	61,196,364	28
High Rainfall zone	7,832,294	4
Temperate zone	9,044,788	4
Pastoral zone	44,319,282	20
Australia	219,700,786	100

Source: Australian Government, 2010a.

The industry average age of the farm owner is 58 years, with averages depending on the individual zone. The industry average education level is 30% having completed university/tertiary or trade, 22% having completed 5-6 years of high school, 34% having completed 1-4 years of high school, and 15% having only primary or no schooling (Australian Government, 2010a). Although, for all producer characteristics mentioned it is worth noting that considerable variations exist across the beef industry. In particular, producers in the Northern region, on

average, generate higher farm business profits than producers in the Southern region. Farm business profits by zone are as follows: Northern region – High Rainfall (\$7,662), Temperate (\$120,394), Pastoral (\$32,975), Southern region – High Rainfall (-\$24,929), Temperate (-\$10,595), Pastoral (\$233,757) (Australian Government, 2010a).

Some authors have noted that the Australian beef industry has evolved from an unstructured, commodity-based system, with low-quality output, into a more organized industry composed of many supply chains with shared incentives, focusing on high quality to respond to the standards demanded in overseas and domestic markets (Morales et al., 2008). Given Australia's high export orientation the country's quality and safety environment is primarily a result of international drivers. However, the domestic market has also played a significant role in shaping the regulatory and market structure. In 1981 and 1982 a few small companies were discovered to be substituting horse, donkey, buffalo, and kangaroo meat for beef being exported to the U.S. in an attempt to take advantage of high beef prices at the time (Spriggs and Isaac, 2001). This event led to the 1982 Export Control Act. Domestic consumers have also been victims to numerous food poisoning outbreaks such as Salmonella, E. coli, and organochloriene residues (DDT and Dieldrin).

Factors affecting the continued success of the beef industry in Australia include repeated droughts, declining domestic demand, changes in foreign demand and preferences, foreign exchange rates, and barriers to trade. Since 1990-91 Australia has witnessed at least three years of widespread drought, leading to

deteriorated pastures, an increased need for supplementary feeding, and reduced stock number (Fletcher et al., 2009). Despite these droughts, herd numbers have remained steady, with a slight increase over the last 10 years (agri benchmark, 2009).

3.1.1 Australia as a Global Player

Australia is a major player in the global beef market, due to its high volume of export. Over the past 20 years production has risen and domestic consumption per person has declined (Bindon and Jones, 2001). Australian domestic consumers currently consume about 37% of the country's domestic beef consumption (agri benchmark, 2009). In additions, beef's share of the meat market dropped from 58% in 1974 to 38% in 1996, primarily as a result of falling behind other meats such as poultry and pig meat (Bindon and Jones, 2001). As a result, the beef industry has become increasingly reliant on export markets (Fletcher et al., 2009). Australia was the world's second largest exporter (measured in tons) in 2008. When measured in value, Australia was the world's largest exporter of beef, followed by Brazil.

Table 3.3 Production and Export Statistics, Australia

		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Total Cattle	million head	23.36	24.45	24.50	24.74	23.62	24.41	25.23	25.61	25.37	25.28
Production	million head	8.76	8.73	8.76	9.05	8.91	8.80	8.47	8.86	8.96	8.70
Production	000 tons	1991	2053	2079	2090	1998	2113	2090	2188	2180	2150
Consumption	000 tons	721	726	674	729	754	762	755	786	797	791
Population	Million	18.9	19.2	19.4	19.7	19.9	20.1	20.4	20.7	21.0	21.4
Consumption	kg per capita	38.1	37.9	34.7	37.1	37.9	37.9	37.0	38.0	37.9	37.0
Export	000 tons	868	902	947	920	841	914	909	954	941	957
Export	US\$ million	1948	2071	2320	2244	2341	3401	3558	3655	3755	4237
Import	000 tons	1	1	1	1	2	4	6	4	2	2
Import	US\$ million	6	4	3	2	6	12	19	17	12	10

Source: agri benchmark, 2009.

Australian meat production has been increasing over time (an increase of 65% from 1984-85 to 2008-09), leading the country to be the world's fifth largest producer with total production of 2.1 million tonnes of beef and veal in 2008 (Fletcher et al., 2009; agri benchmark, 2009). Table 3.3 provides more detailed information on the significance of international trade for the Australian beef industry, as well as the trends over time. From this production, 957,477 tonnes shipped weight of beef and veal were exported (Meat and Livestock Australia, 2009). The largest export market for Australian beef and veal is Japan with 38% (364,000 tonnes shipped weight), followed by the U.S. (234,780 tonnes shipped weight), and Korea (127,207 tonnes shipped weight). Other markets include CIS, Indonesia, Taiwan, Philippines, European Union, and Canada. Since the U.S. intensified their exports to Asian markets, around 1986, Australia's market share has been under intense competition (Bindon and Jones, 2001). The 2003 discovery of bovine spongiform encephalopathy (BSE) in the U.S. led to a restriction on imports of US beef into the Republic of Korea and Japan (Fletcher et al., 2009). As a result of these restrictions, Australia was able to increase the amount of beef exports to these countries. But the recent re-entry of the U.S. into Korean markets has increased competition and lowered prices (agri benchmark, 2009).

One of the goals of Meat and Livestock Australia (MLA) is to work with industry and government to protect and increase access to international markets. Despite such effort, Australian beef exporters still face tariffs imposed by large importing countries, and by their major exporting partners. Many of these are

bound tariffs agreed to under the General Agreement on Tariffs and Trade or the World Trade Organization. For example, Australian beef destined for Japan faces a 50% bound tariff, while beef destined for the U.S. faces an above quota tariff of 26.4% (0% in quota tariff) (Meat and Livestock Australia, 2009).

3.1.2 Industry Organizations

Australian Quarantine and Inspection Services (AQIS)

The Australian meat and livestock industry is governed and supported by numerous organizations that ensure the safety, competitiveness, and sustainability of the industry. The Australian Quarantine and Inspection Service's (AQIS of the Australian Government) Export Meat Program provides inspection, verification and certification services to the export meat industry in Australia (Australian Government, 2010b). The AQIS provides advice and assistance to exporters of agricultural products on export requirements and legislation, export permits and health and phytosanitary certificates, quality assurance arrangements, premises registration requirements, and inspection procedures (Australian Government, 2010b).

The Cattle Council of Australia

The Cattle Council of Australia, established in 1979, has a mission to represent and progress the interests of Australian beef cattle producers, and attempts to bring a national unified voice for beef cattle producers (Cattle Council of Australia, 2010). In the early 1990s their research portfolio was built around the changing forces influencing beef markets, recognizing the need to better

understand genetic and non-genetic factors affecting beef quality (Bindon and Jones, 2001).

Meat and Livestock Australia (MLA)

Meat and Livestock Australia is a producer owned company, with over 46,500 livestock producer members, which provides services and solutions to the entire red meat industry including livestock producers, processors, exporters, foodservice operators and retailers (Meat and Livestock Australia, 2009). The company has a mission to deliver world class services and solutions in partnership with industry and government.

3.1.3 Meat Standards Australia (MSA)

Meat Standards Australia (MSA) is a voluntary meat grading system aimed at predicting consumer palatability scores of cooked beef. The program was launched nationally in 2000. Such a system is especially important to the Australian beef industry since it produces from a very diverse base of climatic extremes, breed and animal managements systems, and processing facilities, all of which contribute to extreme variability in carcass quality (Bindon and Jones, 2001; Polkinghorne et al., 2008a). Perhaps the most important distinction (and innovation) between the MSA grading scheme and other grading systems is that MSA assigns a grade to a specific piece of beef rather than to the entire carcass. This is important as it is seen as an innovation to other systems such as those in the U.S., Canada, and Korea, which assign a quality grade to the carcass after considering a limited number of traits available at the time of grading the chilled carcass (Watson et al., 2008). The MSA label provides consumers with a

guarantee of eating quality at three levels (MSA 3 for Tenderness Guaranteed, MSA 4 for Premium Tenderness, and MSA 5 for Supreme Tenderness) in conjunction with cooking method. Price premiums can then be linked to the individual grades at the retail level. In fact, “...*Australian beef consumers have revealed through actual purchase decisions that they are willing to pay between 4 and 15 percent more for MSA graded cuts than non graded cuts, or about \$0.30-0.40 / kg on a retail carcass equivalent bases*” (Griffith et al., 2010, p. 10).

Figure 3.1 Meat Standards Australia, Grades



MSA Grade	Definition
Non MSA	Ungraded
MSA 3 star	Guaranteed Tenderness
MSA 4 star	Premium Tenderness
MSA 5 star	Supreme Tenderness

Source: Meat and Livestock Australia, 2009.

When proper pricing signals are transmitted throughout the chain all members have an incentive to produce the attributes that the consumers are willing to pay for. Such signals can encourage processors to tender stretch a carcass, to seam bone muscles from traditional cuts and to age some muscles longer (Polkinghorne and Thompson, 2008). And it can have the proper incentives for producers to create or modify genetics or adapt management practices to turn off cattle at a more desirable weight for age and fatness endpoints (Polkinghorne and Thompson, 2008). Registered MSA producers receive feedback on the quality of

their carcasses, which provides information necessary to adjust management practices in a way that optimizes their return. It is easy to see how each entity in the value chain from the farm to fork can benefit, adding significant industry revenue, and increased consumer confidence and satisfaction. In fact, Griffiths et al. (2009) estimate the cumulative retail-level benefit to be around 300 million dollars, with a current annual benefit of around 57 million, which gives an industry benefit ratio of at least 2:1 to date. Such arguments are not unique to domestic markets. Increased chain revenue can also be achieved through proper identification of end user preferences in export markets. Initial studies have shown that consumers in export markets such as Japan, Ireland, and the U.S. also demonstrate an increased willingness-to-pay for increased grades of MSA graded beef (e.g. Griffith et al., 2010).

It is important to note that MLA took a consumer oriented approach when designing MSA. This started with identifying that the key problems were a reduced level of cut and cooking knowledge among consumers and that there was a high degree of variability among beef available to consumers. MLA then did testing on over 60,000 consumers which provided scores on over 420,000 beef samples from more than 42,000 individual cuts (Meat and Livestock Australia, 2009). These scores were then tied to the individual product information which includes the animal's breed, sex, age and growth history, detailed processing and chiller assessment data, individual cut and muscle, days of ageing and cooking method tested (Meat and Livestock Australia, 2009). This demonstrates that each step in the production process has an impact on the assigned grade. Cattle

suppliers provide information through the MSA vendor declaration. Each carcass is identified with a carcass ticket. The grader enters information on each carcass into a data capture unit. Information on the following is recorded: body number and lot number, carcass weight, sex, tropical breed content, hanging method, ossification, marbling, rib fat, pH, and temperature. Once packaged, the grade is communicated to consumers through carton labels. Each carton label contains the MSA grade, ageing periods and cooking methods for the specific cuts.

In order to uphold the integrity of the system certain assurances have been put into place. Each participant (including feedlots, abattoirs, wholesalers, and retailer) in the system are provided with a licence, with licence conditions requiring detailed audits. In addition to this, a DNA sample is taken from every carcass graded. This sample is then labelled with an individual bar code, allowing for complete traceability back to an individual plant, producer, and animal.

The MSA program has seen a respectable level of adoption. Griffith et al. (2010) suggest that currently 850,000 cattle are graded annually, accounting for about 25% of the total domestic kill. While Polkinghorne et al. (2008a) estimate that 40% of all eligible carcasses destined for slaughter in the domestic market are currently graded the by MSA system. Another indicator of its acceptance is the fact that the number of carcasses graded has also been steadily increasing. Polkinghorne and Thompson (2008) suggest that the number of carcasses graded has risen to 786,000 in 2007, from just 225,000 in 1999-2000, and 626,000 in 2006. Further, Polkinghorne and Thompson (2008) mention MSA's prediction that some 2.25 million carcasses will be graded by 2010-2011. But where the

system has not been adopted the reason is assumed to be due to the perceptions of required change or available commercial benefit (Polkinghorne et al., 2008a). Due to the combined facts that the MSA grading system is seen as an innovation, and many value chains have chosen to adopt it in varying forms, the system has attracted significant interest among meat scientists, as well as preliminary work by economists. For instance, economic studies have estimated the benefits of the program (Griffiths et al., 2009). Smith et al. (2008) outline the characterisation of the MSA grading system for assessing beef quality. In this same journal volume meat scientists evaluate various cattle and meat performance criteria that affect the quality grade.

3.1.4 Traceability in Australia

Australia is an example of a world leader in animal traceability, and has had a cattle identification system in place since the 1960's (Tonsor and Schroeder, 2006). Like the Canadian system, the current system in Australia is able to trace an individual animal from its property of birth to its slaughter destination. The National Livestock Identification System (NLIS) is the most recent system and in order to maintain their competitive advantage NLIS became mandatory for all of Australia in 2005 (Meat and Livestock Australia, 2009). The NLIS was first introduced in 1999 to replace the then current paper based tracking system and to meet requirements for export to the European Union (Meat and Livestock Australia, 2009). As a result, a recent exercise of randomly selecting tags proved the program's efficiency by determining that the program had the ability to trace 99% of cattle back to their property of birth within 24 hours (Meat and Livestock

Australia, 2009). Meat and Livestock Australia (2009) mentions the benefits of the system to industry to be meeting traceability performance standards for determining where animals have resided, and are currently residing, reducing the financial and social impact of a livestock disease, epidemic, or chemical residue incident, maintaining access to international markets, and maintaining consumer confidence in the safety and quality of Australian beef and dairy products.

3.1.5 The Environment

Given the fact that the beef industry in Australia is a major user of the land resources, cow-calf grazing and feedlots in particular must pay attention to their environmental footprints (Australian Government, 2010a). The Australian Government (2010a) outlines a number of these challenges. For grazing stock, land management of improved pasture systems can have an impact on quality, quantity, and the stability of plant species. Land degradation from soil and water erosion can occur as a result of overgrazing and clearing of native vegetation. There is a further need for effective management of woody vegetation to prevent loss of biodiversity and dry land salinity. In addition, nutrient management due to soil loss, and practices around weed and pest control have been highlighted as recurring issues in environmental management. Environmental management issues arising from feedlot operations include effective utilization of effluent and manure, protection of the land from degradation, protection of groundwater and surface water resources, and protection of community amenity (Australian Government, 2010a).

In 2009, Land and Water Australia issued a report titled “climate change impacts on Australia’s rangeland livestock carrying capacity” (Australian Government, 2009). Since variations in climate over time have an impact on rangeland forage and livestock production, this report looks at climate change projections for regions of Australia, including changes in temperature, rainfall and carbon dioxide levels. It points out that projections done by CSIRO and the Bureau of Meteorology are for hotter and drier conditions across most of the Australian rangelands (but these effects may be partially offset by a more uncertain increasing levels of carbon dioxide). With the climatic changes will come an increased pressure for adaptations of rangeland managerial practices. Such strategies that have been useful in the past for variability will prove to be useful under climate change. As stewards of the rangelands, producers will need to maintain relatively low numbers of livestock, frequently adjusting the number of livestock to match changing feed availability, and responding quickly at the first sign of drought. And lastly, after a drought, delayed restocking of the resource will allow for recovery of the desired pasture.

3.2 Overview of the Canadian Beef Industry

The Canadian beef industry is a significant player in the international area, and plays a significant role in the Canadian economy. It is estimated that the cattle industry in Canada contributes approximately 25 billion dollars to the Canadian economy (Canadian Cattlemen’s Association, 2010). Approximately 110,000 of the 229,000 farms located in Canada report a beef cattle population (Canadian Cattlemen’s Association, 2010), with an average Canadian herd size of 53 head

(see table 3.4). Approximately 15% of Canadian farm cash receipts are contributed to the cattle industry, totalling 6.6 billion dollars in 2008, up from 6.2 billion dollars in 2007 (Canadian Beef Export Federation, 2010; Canadian Cattlemen’s Association, 2010). Total production was 1.6 million tonnes (beef plus live cattle exports) in 2007. The beef processing industry has had continual restructuring and consolidation, leading to newly invigorated companies with increased production capacities and efficiencies (Canadian Beef Export Federation, 2010). The meat processing industry in Canada is the third largest sector in the manufacturing industry, following motor vehicles and petroleum products (Canadian Cattlemen’s Association, 2010). Processing capacity reached 5.1 million head per year in 2006, with 3.25 million head processed in 2008 (Canadian Beef Export Federation, 2010).

Table 3.4 Distribution of Beef Cattle Farms, Canada

Herd Size	Census of Agriculture (2001)	% of farms with respective herd size	
		Brocklebank and Hobbs (2004)	Steiner et al. (2007)
less than 50		20.00	38.18
50-100 head	Average Canadian Herd Size: 53 head.	18.00	
100-150	Average Western Canadian Herd Size: 67 head	20.00	36.36
150-200		21.00	
200-300		10.00	29.09
more than 300		11.00	6.36

Source: Steiner et al., 2007.

But the beef industry in Canada has had to face many challenges in recent years, including (Alberta Beef Producers, 2009; agri benchmark, 2009):

- drought of 2002 and again in 2009,
- discovery of bovine spongiform encephalopathy (BSE) in 2003, and subsequent R-CALF challenges in 2004,
- the rising value of the Canadian dollar, and the volatility of the Canadian / U.S. exchange rate,
- high feed grain prices,
- country of origin labelling (COOL) in the U.S. in 2008,
- the global economic collapse affecting commodity prices,
- and most recently, an outbreak of listeriosis.

Canadian consumers only consume approximately 35% of the beef produced in Canada (agri benchmark, 2009). For this reason, the beef industry in Canada is also heavily reliant on export markets, specifically the U.S. Such external pressures have threatened the beef industry and in addition to having an impact on profitability, put pressures on its competitiveness in international markets. As a result of these recent challenges, retention of breeding herds has been steadily decreasing since 2005 (15.1 million head in 2005), leading to total cattle and calf numbers having decreased year over year from 13.89 million head in January 2008 to 13.18 million head in January 2009 (agri benchmark, 2009).

Canadian beef producers have traditionally based their herds on the early maturing and relatively easy finishing breeds such as *Herefords* and *Angus*. Since the early 1970's, later maturing and faster growing breeds such as *Charolais*,

Simmental, and *Limousin* were introduced (Canadian Beef Export Federation, 2010). Currently Canada's beef herd is made up entirely of *Bos taurus* (*Hereford*, *Angus*, *Charolais*, *Simmental*, among others) animals, with little to no *Bos indicus*. Research done by the Department of Agriculture in the U.S. indicates that meat produced from *Bos taurus* animals are more tender than from *Bos indicus* (Wheeler et al., 1994). This provides a tenderness advantage to Canada over herds found in Australia and the U.S.

3.2.1 Canada as a Global Player

Table 3.5 indicates the size of the Canadian beef industry relative to rest of the world. In 2009 Canada was the fifth largest exporter of beef in the world (measured in value). Canada's major export markets include the U.S. (79%) and Mexico (11%). Prior to the Canada-US Trade Agreement (CUSTA) in 1988, the flow of cattle and beef in North America was primarily east-west (within their respective countries) (Brocklebank et al., 2008). While CUSTA was only partially successful in removing trade barriers the agreement did have a positive impact on opening up cross border (north-south) trade.

Table 3.5 World Beef Export Rankings

	Australia	Canada	United States	Brazil
Inventory (head)	10	18	4	1
Production (tons)	5	10	1	2
Export (tons)	2	10	3	1
Export (US\$)	1	5	6	2
Import (tons)	93	13	1	34
Import (US\$)	84	12	1	33

Source: agri benchmark, 2009.

Bovine spongiform encephalopathy has shown that dependence on the U.S. market for Canadian beef is not a sustainable production and export marketing strategy. Just prior to the discovery of BSE in May 2003, about half of the total Canadian beef production was intended for foreign markets. About seventy percent of this was being sent to the U.S. and the remainder to Mexico, Japan, South Korea, and other countries (Le Roy, 2006). Following the discovery of BSE in Canada in May 2003, thirty four countries, including the U.S. and Mexico, banned the importation of cattle from Canada. (Le Roy, 2006). As a result of such excess capacity domestic cattle and beef prices were depressed. “*The consequences of the BSE discovery in Canada hurt all aspects of the domestic beef sector*” (Le Roy, 2006, p. 2). The World Organization for Animal Health (2010) is currently reporting Canada’s BSE status at “controlled BSE risk”. This is the same status as the U.S., Brazil, and Mexico, but provides an international competitive disadvantage to countries such as Australia, whose current status is “negligible BSE risk”. This incident also demonstrated the consequence of such reliance on one market, and proved that the Canadian beef industry is more dependent on the U. S. than the U.S. is dependent on Canada (Spriggs and Isacc, 2001).

The U.S. recently introduced mandatory country of origin labelling on the container in which all import products are shipped, which has proved to be a hindrance to exporting beef into the U.S. (Alberta Beef Producers, 2009). These new country of origin labelling requirements have caused conflict with international trade agreements and have been viewed as a technical barrier to

trade. In 2007 the Government of Canada initiated a WTO case against the U.S. in regard to the mandatory country of origin labelling. As a result, some flexibility appeared in the final rule (Alberta Beef Producers, 2009). Despite such challenges, the U.S. continues to be the world's largest beef consuming nation and the world's largest importer of beef (agri benchmark, 2009; Alberta Beef Producers, 2009). In addition, the U.S. continues to offer the highest value market with the least import barriers for Canadian beef (Alberta Beef Producers, 2009). And with increasing investments by U.S. multinationals into slaughter facilities in Alberta, integration and cost competitiveness, via modernized facilities, will most likely be a catalyst for cross border competitiveness (Alberta Agriculture, Food, and Rural Development, 2001).

Table 3.6 Production and Export Statistics, Canada

		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Total Cattle	million head	14.75	14.97	15.42	15.42	15.67	16.61	16.88	16.00	15.83	15.20
Production	million head	3.50	3.41	3.37	3.46	3.16	3.93	3.93	3.55	3.42	3.47
Production	000 tons	1528	1535	1627	1666	1325	1507	1607	1598	1605	1633
Consumption	000 tons	724	718	695	700	748	719	713	710	736	714
Population	Million	30.4	30.7	31	31.4	31.6	31.9	32.2	32.6	32.9	33.3
Consumption	kg per capita	23.8	23.4	22.4	22.3	23.7	22.5	22.1	21.8	22.4	21.4
Export	000 tons	413	439	484	516	323	456	458	368	362	393
Export	US\$ million	1112	1266	1441	1404	1044	1486	1536	1180	1162	1281
Import	000 tons	189	196	229	230	200	80	91	112	153	140
Import	US\$ million	427	463	510	515	516	234	306	469	670	704

Source: agri benchmark, 2009.

Producer groups, along with the Canadian Government have been attempting to identify high value markets, and have had a push to increase access to such markets. In 2008 the Alberta Government announced the Alberta Livestock and Meat Strategy. Among other initiatives, the Alberta Livestock and Meat Agency Limited (a provincial corporation) was formed. *“Under the auspices of the Alberta Livestock and Meat Strategy, the Agency has a leadership role to define and lead a strategic approach to position the livestock and meat industry for success”* (Alberta Livestock and Meat Agency Limited, 2010). According to the Canadian Beef Export Federation (2010), the greatest opportunities have been identified in Japan, South Korea, Mexico, Taiwan, Hong Kong, China, South-East Asia, as well as the U.S. In addition, many groups remain optimistic for increased access to the European Union.

In order to be successful in the international market Canada needs to communicate its competitive advantage to its international partners. The Beef Information Center claims that Canada’s points of differentiation from international competitors includes quality attributes such as superior genetics, excellent animal health management, individual animal identification, world renowned food safety system, superior grading, excellent supply capability, and improved profitability (Alberta Beef Producers, 2009).

3.2.2 Industry Organizations

Canadian Food Inspection Agency

The Canadian meat and livestock industry is governed and supported by numerous organizations that ensure the safety, competitiveness, and sustainability

of the industry. The CFIA's mission is to safeguard food, animals, and plants, which enhances the health and well-being of Canada's people, environment and economy (Canadian Food Inspection Agency, 2010). The Food Safety Enhancement Program (FSIP) is CFIA's approach to encourage and support all federally registered establishments, with the exception of fish and seafood establishments, to develop, implement and maintain a HACCP system (Government of Canada, 2009). Firms that are not producing for either export or inter-provincial trade are not required to be federally registered. Only when meat products are intended to cross either a provincial or national border are these establishments required to be federally registered.

Alberta Livestock and Meat Agency

In 2008 the Alberta Government announced the Alberta Livestock and Meat Strategy. *"The Alberta Livestock and Meat Strategy is a comprehensive blueprint to achieve an internationally respected, competitive and profitable livestock and meat industry for the province."* (Government of Alberta, 2010). Among other initiatives, the Alberta Livestock and Meat Agency Limited (a provincial corporation) was formed. *"Under the auspices of the Alberta Livestock and Meat Strategy, the Agency has a leadership role to define and lead a strategic approach to position the livestock and meat industry for success"* (Alberta Livestock and Meat Agency Limited, 2010, p. 1).

The Canadian Cattlemen's Association

The Canadian Cattlemen's Association was established in 1932 and provides a national voice for over 90,000 producers, and represents all phases of the

production system (Canadian Cattlemen's Association, 2010). The current areas of focus for the Canadian Cattlemen's Association include (Canadian Cattlemen's Association, 2010):

- market access and trade regulations,
- animal care,
- animal health,
- grading/inspection,
- environmental stewardship,
- marketing,
- government and regulatory affairs,
- and fiscal / monetary policy and business risk management.

The Alberta Beef Producers

The Alberta Beef Producers represent producers in the province of Alberta. The Alberta Beef Producers was established in 1969 and has a mission to strengthen the sustainability and competitiveness of the beef industry for the benefit of Alberta beef producers (Alberta Beef Producers, 2010).

3.2.3 Canadian Beef Grading Agency (CBGA)

The Canadian Food Inspection Agency has accredited the Canadian Beef Grading Agency (CBGA) to deliver beef grading services to the beef industry in Canada. The CBGA is a private, not for profit corporation, initially created in 1929. Like in Australia, beef grading in Canada is done on a voluntary basis. Approximately 85% of all federally inspected carcasses processed in Canada in 2008 were graded by CBGA (Canadian Beef Export Federation, 2010). Once a

carcass has been inspected and approved for health and safety standards, it may be graded by a certified grader. In order to ensure reliability of the grading system, certified graders undergo ongoing scheduled audits.

Certified graders assess a carcass based on age, sex, conformation / muscling, fat color and texture, and meat color, texture and marbling. Based on these characteristics the grading scheme is able to place carcasses into uniform groups of similar quality, yield, and value (Canadian Beef Grading Agency, 2010). This allows the system to classify carcasses into 13 beef grades, as illustrated in table 3.7.

Table 3.7 Quality Grades, Canada

Grade	Maturity (Age)	Muscling	Rib Eye Muscle	Marbling	Fat Colour and Texture	Fat Measure
CANADA PRIME	Youthful	Good to excellent with some deficiencies	Firm, bright red	Slightly abundant	Firm, white or amber	2 mm or more
CANADA A, AA, AAA	Youthful	Good to excellent with some deficiencies	Firm, bright red	A – trace AA – slight AAA – small	Firm, white or amber	2 mm or more
B1	Youthful	Good to excellent with some deficiencies	Firm, bright red	No requirement	Firm, white or amber	Less than 2 mm
B2	Youthful	Deficient to excellent	Bright red	No requirement	Yellow	No requirement
B3	Youthful	Deficient to good	Bright red	No requirement	White or amber	No requirement
B4	Youthful	Deficient to excellent	Dark red	No requirement	No requirement	No requirement
D1	Mature	Excellent	No requirement	No requirement	Firm, white or amber	Less than 15 mm
D2	Mature	Medium to excellent	No requirement	No requirement	White to yellow	Less than 15 mm
D3	Mature	Deficient	No requirement	No requirement	No requirement	Less than 15 mm
D4	Mature	Deficient to excellent	No requirement	No requirement	No requirement	15 mm or more
E	Youthful or mature	Pronounced masculinity				

Source: Canadian Beef Grading Agency, 2010.

The four highest quality grades in table 3.7 (Canada Prime, AAA, AA and A) represent about 88% of all graded beef in 2008 (Canadian Beef Export Federation, 2010). The Canadian beef grading system is similar to the system implemented in the U.S., especially when it comes to classification. The minimum marbling standards for USDA Prime, Choice and Select are identical to those used in the Canadian grading system for Canada Prime, Canada AAA, and Canada AA respectively (Canadian Beef Grading Agency, 2010).

3.2.4 Traceability in Canada

The primary traceability system in Canada was established in 2001 and is enforced by the CFIA. *“The Canadian Cattle Identification Program is an industry initiated and established trace back system designed for the containment and eradication of animal disease.”* (Canadian Food Inspection Agency, 2009a). The key component to the system is that all cattle must be identified by an approved ear tag prior to leaving their farm of origin. The Canadian system was developed in response to industry leaders’ recognition of the importance of safeguarding the national herd and assuring consumer confidence at home and in the export market. In addition to mandatory traceability, the Canadian Cattle Identification Agency (CCIA) has also implemented a voluntary program which enables producers to store further information should it be requested by domestic or export markets. For example, age verification links an animal identification number to the animals’ birth date data. The Canadian Cattle Identification Program currently receives 97% compliance (Canadian Food Inspection Agency, 2009b).

3.2.5 Environment

Canada has 67,586,000 hectares classified as agricultural land (Canadian Cattlemen's Association, 2010). Approximately 30% of this is not considered economically or environmentally suitable for cultivation, but does support grazing of livestock (Canadian Cattlemen's Association, 2010). Similarly, almost a third of Alberta's 66,368,000 hectares is used for agriculture (Alberta Beef Producers, 2009). Given the vast amount of land used by agriculture in Canada, the Canadian agricultural and beef industry is subject to similar environmental issues as the agricultural industry in Australia and other parts of the world. For example, Canadian cattle contribute approximately 0.025% of the greenhouse effect from methane emissions worldwide (Canadian Cattlemen's Association, 2010).

Canadian producers have made numerous changes to their operations over time, such as implementing beneficial management practices, to mitigate the impact of beef production on water, air, and soil quality. The Alberta Government outlines a number of these practices in a 2004 report titled "Beneficial Management Practices: Environmental Manual for Alberta Cow/Calf Producers" (Alberta Agriculture, Food and Rural Development, 2004).

3.3.0 Conclusion: Industry Comparison

The Australian and Canadian meat and livestock beef industries share many commonalities. Given the relative size of exports both industries are major players in the international arena. Success by both countries is contingent on demonstrating to their international players that their respective products are safer and of higher quality than other international exporting countries. In order to do

this, importing countries must, for example, perceive their traceability and quality grading systems to be both effective and reliable. The discovery of BSE in Canada in 2003 proved to be harmful to all aspects of the Canadian beef industry, and has had long lasting effects (Le Roy, 2006). At the same time, this discovery helped to boost the value of exports from countries, such as Australia, who currently have a status of negligible BSE risk (Fletcher et al., 2009; World Organization for Animal Health, 2010).

Morales et al. (2008) note that the Australian beef industry has evolved from a unstructured, commodity-based system, with low-quality output, into a more organized industry composed of many supply chains with shared incentives, focusing on high quality to respond to the standards demanded in overseas and domestic markets. Given Australia's high export orientation the country's quality and safety environment is primarily a result of international drivers. In Canada, *"...closer coordination through supply chain alliances is developing alongside the traditional commodity production system as a means to present consumers with differentiated, value-added products"* (Brocklebank and Hobbs, 2004). Branded beef programs are emerging as a response to consumer demands for differentiate products, but to date only on a relatively limited scale (Brocklebank and Hobbs, 2004).

As with the adoption of any concept (supply chain integration, traceability, producing desired attributes, grading systems, etc) the parties that will benefit from altering their behaviour (e.g. adoption) need to be informed and educated on the benefits. This education has been claimed to be theoretically easier to do in

Australia than in other countries for two primary reasons: larger farm sizes and heavy export orientation. Larger farm sizes leads to fewer producers to convince of the benefits. Given a larger volume of beef production is exported, Australian producers are also more likely to understand the importance of trade, and thus the adoption of methods such as traceability and advanced grading systems that help facilitate trade. In addition, cow-calf operations in Canada tend to be mixed farming operations, and as a result, the opportunity costs of reallocating human and capital resources from together enterprises into cow-calf production can be quite high (Brocklebank and Hobbs, 2004). Another barrier for individual producers for forming trusting alliances and building brands is due to the high concentration of the feedlot and processing sector. In Canada, the three largest processors account for about 90% of the total Canadian slaughter capacity, where as the top 25 processors in Australia account for approximately 77% of Australia's red meat production (John, 2007; Fletcher et al., 2009).

Chapter Four: A Case Study Approach to Analyzing Developments in Australian Beef Value Chains

4.1 Introduction

Modern meat consumers are demanding an increasing variety and quality of product and process attributes, such as origin or production methods (Loureiro and Umberger, 2003; Umberger et al., 2003). More discriminating consumers asking for branded and differentiated products have motivated former commodity meat supply chains to focus on quality signals. Such consumer signals or purchase cues cover an ever widening spectrum of characteristics far beyond meat cut, appearance, and pricing information. Labeling and certification of production systems and animal welfare practices used in livestock farming (e.g. natural production, free range) significantly gained in importance in the last two decades (eg: Latvala and Kola 2000; Loureiro and Umberger, 2007; Wezemael et al., 2010).

Recent evidence suggests that progress has been made in coordination and integration of beef value chains in North America and elsewhere. The focus has been on improving chain productivity, economic risk management and transparency with regard to food safety and quality attributes (Deimel et al., 2008; Harri et al., 2009). Breeding and processing efforts have focused on producing more homogenous carcasses based on existing carcass grading schemes (e.g. USDA). To satisfy increasing demands for various beef attributes (search, experience, credence), and to hedge against systemic risks, the implementation of chain-wide quality management systems are regarded as possibly the most sustainable strategy. It is increasingly recognized that individual producers are no

longer able to ensure the increasing range of meat quality attribute dimensions on their own. As a consequence, a system-wide approach to managing quality, price and systemic risks, is becoming increasingly attractive.

New forms of inter-organizational relationships (e.g. caused by increased information flows) and new technologies or innovations (e.g. grading technology) enable the emergence of more integrated supply chains (Handfield and Nichols, 1999; Karantininis et al., 2010; Schulze et al., 2007). A well-designed and executed grading system can therefore not only provide advantages to consumers, but potentially to all members along the value chain. Consumers can benefit from improved product consistencies (reducing information asymmetry), increasing their confidence in meat suppliers, and may thus reduce their declining meat consumption to a lesser extent (Nelson, 1970; Polkinghorne et al., 2008a). As a result of greater consumer confidence, all members along the value chain can potentially benefit from improved pricing signals, increased market share, and profitability. The Meat Standards Australia (MSA) system can be regarded as a success in these areas. It is adapted to an industry with a very diverse base of climatic extremes, breed and animal managements systems, and processing facilities, all of which contribute to high variability in carcass quality (Bindon and Jones, 2001; Polkinghorne et al., 2008a). Perhaps the most important distinction between the MSA grading scheme and grading systems in Canada and the U.S. is that MSA assigns a grade to a specific piece of beef rather than to the entire carcass. This characteristic is seen as an innovation to grading systems in the U.S., Canada, and Korea, which assign a quality grade to the entire carcass after

considering a limited number of traits available at the time of grading the chilled carcass (Watson et al., 2008).

A fully integrated beef grading system with built in quality control mechanisms can have important effects on individual companies and the industry as a whole (Griffith et al., 2009). This paper aims to contribute to a better understanding and quantification of the effects of closer value chain coordination and integration on the success of beef value chain systems. The case of the MSA system in the Australian beef industry is analyzed as a best in class approach, taking the view of Ketchen et al. (2008) for analyzing best practice value chains. Best value supply chains are distinguished as being designed to deliver superior total value to the customer in terms of speed, cost, quality, and flexibility, rather than focusing primarily on speed or cost or any other single metric, and are thus more likely to enhance their performance (Kethen et al., 2008). The focus is on chains that have developed farm-to-retail brand-driven value chains in the Australian beef market. The analysis is based on a cross-section of in-depth interviews with processors and retailers in value chains of differential degrees of vertical coordination, focusing on usage of the MSA system. Further analysis includes examining the influence that firm level characteristics, existing degrees of coordination and communication within a chain, and demand driven incentives have had on the emergence and design of consumer-driven best practice value chains in the beef industry. This chapter provides evidence of how the increased information provided as a result of implementing the MSA grading system can have a positive effect on value chain coordination.

Section 4.2 reviews theoretical and empirical literature relevant to value chain development and coordination. Section 4.4 then introduces the case study approach and survey questionnaire. A brief overview of the companies interviewed is then presented. The remaining sections analyze MSA's influence on value chain improvements based on common value chain benchmarks. The chapter concludes with a summary of research findings, recommendations and a research outlook.

4.2 Traditional Approaches to Coordination Problems: Transaction Costs and Principle Agent Theory

Much of the literature on increasing vertical coordination and integration in the above meat chains has focused on transaction costs and principle agent theory that are involved if firms were to continue to rely on the marketplace. A number of economic theories try to explain why value chain relationships evolve or fail to evolve. Transaction cost theory relates to choosing the most efficient level of integration in an attempt to minimize costs from opportunistic behaviour (holdup), recognizing that firms operate in an environment of incomplete and asymmetric information (Williamson, 1985; Frank and Henderson, 1992). Thus, transaction costs not only include negotiation, contracting, monitoring, enforcement, and dispute resolution costs, but also information costs (Nelson, 1970; Richardson, 1972; Williamson, 1985; Martinez et al., 2006; Hocomb and Hitt, 2007). Information costs appear to be particularly important in the context of beef value chains due to inherent information asymmetries with fresh meat (Martinez et al., 2006; Schulze et al., 2007). The costs related to measuring quality and identifying

buyers and sellers in the marketplace can be significant in the meat and livestock industry, since many attributes are difficult to measure both ante mortem and post mortem. The extent to which increased information sharing improves a value chain's coordination and profitability (for example, as a result of the implementation of the MSA grading system) is thus of great interest to emerging beef value chains and policymakers.

An extensive literature exists exploring the benefits of value chain formation, also contrasting the competing chain to chain versus the traditional firm to firm locus of competition in the global marketplace. For example, managed supply chains are considered to offer added value through proactive cooperative efforts among supply chain participants (McCarter and Northcraft, 2006). Schroeder (2003) suggests that in order to be successful in the international arena, a strong commitment to a common goal among vertically aligned industry participants is required.

Closer vertical integration and coordination in beef value chains has been aimed at, and is explored in a number of studies (e.g. Fearne, 1998; Fearne and Duffy, 2004; Olivier, 2004; Griffith et al., 2009). In a Canadian study, Schroeder (2003) recommends establishing strategies to bring together necessary vertical market chain participants. Evidence from these studies suggests that alliances can better achieve the development of a more differentiated product, relative to international competitors. The suggested strategies include, among others, an improved information exchange across chain members, the development of an

industry vision statement, the promotion and cultivation of alliances that enhance vertical alignment, and differentiation through product attribute enhancement.

Considering the importance of information flows about quality, costs and prices throughout value chains, issues related to the reluctance to share private information and to fulfill quality-related obligations leads to the question: what role can contracts play in these value chains? Evidence suggests that contracts cannot only help to protect each value-chain party from opportunistic behaviour, but also be used as a risk-sharing device (MacDonald et al., 2004). Thus, the supply chain literature has focused on principle agent theory, property rights theory and incomplete contract theory to explore the consequences of these information issues (e.g. Grossman and Hart, 1986; Sauvee, 1998; Wysocki et al., 2003). Considering different firms in the value chain as principals and agents, their interaction can be characterized through a structure of incentives and delegation (Jensen and Meckling, 1976; Eisenhardt, 1985; Eisenhardt, 1989a; Lawrence et al., 2001; MacDonald et al., 2004). When considering value chain captains, the concept of delegating authority, as is the case when a chain captain allows others to act on its behalf, becomes of central importance to potentially improving value chain coordination. In this case, Ketchen and Hult (2007) suggest that the participants are forced to choose between a course of action that benefits their own firm versus one that benefits the chain as a whole. However, even if all chain members have similar quality-related goals, the difficulty to verify an agent's action in the chain likely creates incentives for non-performance, particularly in cases where quality is difficult to observe (e.g. tenderness) or in cases where

efforts are difficult to observe (e.g. in the case of retained ownership of a cow-calf operation into a feedlot, where certain efforts of the feedlot operator may be unobservable to the cow-calf producer). In such cases, an information-sharing system that improves the verification ability of the value chain captain, and/or the leadership component of that value chain captain likely improves coordination and chain performance. Considering the “best value supply chain” approach (Ketchen et al., 2008), which encompasses these aspects as part of a customer-focused value chain approach, how does the Australian MSA experience measure up?

4.2.1 From Supply Chain to ‘Best Value Supply Chain Focus’

Over time there has been an evolution in organizational theory from a supply chain focus to a value chain focus, and most recently to best value supply chain focus (Porter, 1985; Ketchen and Hult, 2007). Handfield and Nichols (1999) define the supply chain as encompassing all activities associated with the flow and transformation of goods from the raw materials stage, through to the end user, as well as the associated information flows. The concept of a value chain, as initially proposed by Porter (1985), depicts the firm as a collection of discrete, value creating activities (inbound logistics, production operations, outbound logistics, marketing and sales) and four support activities (firm infrastructure activities, such as finance and accounting, human resources management, technology development, and procurement). Value chains, as they stretch over multiple firms, can be different from supply chains in the following ways: more communication, value/quality focused (versus cost/price focused), differentiated product (versus commodity), demand pull relationship (versus supply push), interdependent

organizational structure (versus independent), and have a philosophy of chain optimization (versus self optimization) (Alberta Agriculture and Food Council, 2004).

Ketchen and Hult (2007), and later Ketchen et al. (2008), take the value chain concept one step further through defining “best value supply chains”. Ketchen et al. (2008) suggest that organizations which develop best value supply chains (BVSCs) are likely to enhance their performance. Ketchen et al. (2008) define BVSCs as being designed to deliver superior total value to the customer in terms of speed, cost, quality, and flexibility, rather than focusing primarily on speed or cost or any other single metric. These “competitive priorities” can be achieved through strategic supply chain management and increased coordination. Best value supply chains are further distinguished from traditional supply chains in a number of ways. For example, traditional supply chains focus on transactions costs as the basis of their integration (make / buy) decisions (Holcomb and Hitt, 2007), whereas BVSCs focus on total cost, with short term costs playing a secondary role to the potential for long term trusting relationships. Similarly, BVSC theory builds on agency theory by using a reward structure (e.g. series of incentives) to minimize opportunistic behaviours. Since most customers’ needs are multifaceted, BVSCs can provide superior outcomes in terms of overall customer satisfaction (Ketchen et al., 2008).

Ketchen and Hult (2007) outline that BVSCs use strategic supply chain management as a strategic weapon, in contrast to traditional chains that view supply chain management as a method to move products in order to support

strategy. Best value supply chains can be more agile, adaptive, and aligned. And ultimately, they can compete in total value across speed, quality, cost, and flexibility, in contrast to traditional supply chains that would typically focus on one of these four competitive priorities. Best value supply chains are thus most likely to prosper within today's competitive global landscape (Ketchen and Hult, 2007). Many advocates of MSA suggest that MSA provides both a higher quality and a more consistent product and thus a competitive advantage in the global landscape for those firms that choose to adopt the grading scheme. There does not seem to be any debate in the agriculture and agri-food literature on this. But at what cost does this grading system come to individual firms in the industry, as a result of implementing the grading system? Does it become a hindrance to chain coordination and to value chain performance or is it a catalyst? This research uses the criteria of BVSCs as one tool to explore answers to these questions, and thus, uses the BVSC concept as a benchmark in assessing the effects that the MSA grading system has had on individual companies and on the Australian beef sector as a whole.

4.3 Previous Literature on MSA

Meat Standards Australia is a meat grading system developed by Meat and Livestock Australia. *“Meat and Livestock Australia provides research and development, marketing and market information to benefit the red meat industry”* (Meat and Livestock Australia, 2009). Given the economic potential behind the aforementioned information sharing and value-creating systems, it is not surprising that it has generated significant attention in the recent literature. Polkinghorne

(2008) focuses on the drivers behind the MSA system, including the science, the willingness-to-pay for beef quality grades, consumer assessment, and ways for optimizing returns in the supply chain. In addition, Griffith et al. (2009) calculate a benefit-cost ratio for the MSA system. Yet, the empirical evidence on economic factors that drive value chain performance and determine adoption levels in emerging chains is still scarce. More specifically, it appears that an empirical analysis which explores the effects of a grading system as part of a system-wide information sharing system on supply chain development is entirely missing. In an attempt to better understand and quantify the effects of the MSA system on coordination and value chain creation in the Australian beef industry, the empirical approach is based on a case-study analysis of MSA stakeholders and their value chain approaches. Section 3.1.3 provides a more in depth overview of MSA and a review of prior literature on MSA.

4.4 Analysis of Case Studies

In contrast to single-case designs, comparative case studies have become the leading approach to case study research that can contribute to theory development (Dubois and Araujo, 2007). Earlier work by Eisenhardt (1989b) supports this view, as she suggests that it is preferable that cases be selected on a theoretical, and not random sampling basis. This gives the ability to focus efforts on theoretically useful cases as well as the ability to compare and contrast polar types. *“Multiple case studies should not be confused with observations drawn from a pre-selected population according to randomness or representative criteria”* (Dubois and Araujo, 2007, p. 177). Therefore, multiple respondents were

employed to capture a variety of perceptions. Firms that did not adopt the MSA system were not interviewed. For this reason, this research did not have a control group, nor were we able to directly determine how these same firms would have developed in the absence of adopting MSA.

4.4.1 Identification of Sample Population and Case Study Design

This study employs a sample of companies that ranged in their level of integration, size, and level of MSA utilization. The level of (or transition toward) mutual decision making, cost sharing (that relates specifically to MSA), sharing of MSA premiums, and profit sharing are used as proxies for vertical coordination. Companies along these spectrums were identified in a consultation with Meat and Livestock Australia and The Cooperative Research Centre for Beef Genetic Technology (2010).¹

Eisenhardt (1989b) suggests that a number between four and 10 cases usually works well. With fewer than four cases it is often difficult to generate theory with much complexity, and its empirical grounding is likely to be unconvincing. And with more than 10 cases it quickly becomes difficult to cope with the complexity (Eisenhardt, 1989b). The level of time commitment required of companies, and the feasibility of travel costs and time, put a constraint on the upper bound of cases. Given this set of criteria and constraints, the decision was made to focus on five companies. Companies selected are the brand holders and

¹ The Beef CRC is a cooperative research centre funded by the Commonwealth Government. Among other initiatives, one of their core focuses is to improve the capacity to deliver high quality beef to Australia's global markets (The Co-operative Research Centre for Beef Genetic Technologies, 2010)

‘chain captains’ which can drive the decisions for MSA adoption and level of investment. Within the Australian red meat industry these players tend to have the largest segment of their business in processing and/or retailing. A review of the MSA literature and the discussions among the initial focus groups suggests that a number of issues (as they relate to industry perceptions and thus adoption of MSA) were common to certain geographic areas. For this reason, respondents were not limited to a particular geographic location or state.

4.4.2 Case Study Hypotheses

The greater information flow required by the MSA system helps to increase the value chain captain’s knowledge of the agent’s behaviour. Thereby, MSA contributes to overcoming information asymmetries, while increasing the overall value added, and ensuring a more equitable sharing of value added.

Specific hypotheses:

- 1. Best Value Supply Chain: Chains that adopt MSA will enhance their performance by being better positioned to deliver superior total value to the customer in terms of speed, cost, quality and flexibility.*
- 2. Coordination: MSA is a catalyst for increased coordination through providing a platform for increased mutual decision making, cost sharing, sharing of MSA premiums, and profits.*
- 3. Information: It is anticipated that the emergence of new forms of inter-organizational relationships and new technologies enable the emergence of*

more integrated supply chains (Handfield and Nichols, 1999), with subsequent increase in value chain performance.

4. *Trust: MSA contributes to overcoming the disincentives of sharing individual profit opportunities, which are often a result of information asymmetries, resulting in asymmetrically distributed benefits in value chains.*

4.4.3 Questionnaire design

The design of the initial survey draft was guided by expert elicitation literature (McCracken, 1988; Strauss and Corbin, 2008). Previous analyses that conducted in-depth interviews with managers were used as guidance for conducting these interviews (Fugate et al., 2005). Different parts of the survey were then tested with individuals from industry and academia. For example, discussions with the Beef CRC, employees from MSA, and a managing director of a value added meat distributor, helped to refine the survey. Once the final set of participating companies was identified, each company was contacted via email and provided with the objectives of our study and an outline of the time commitment required. A follow up phone call was made to book appointments for interviews to be held on site at either their office or processing facilities.

In-depth elicitations were conducted during November and December 2009 with a single contact within each company. These contacts were either managing directors or were involved in the company's decision making process for the issues at hand. A detailed questionnaire (See Appendix 8.1) was used to guide and stimulate discussions and was completed in full by each company during a one-on-

one session that lasted between one and a half to two hours. This questionnaire was 12 pages in length, guided by the same interviewer across firms. Likert-scale questions were used, primarily to allow for ease of comparison across companies, but also to provide a more structured recording platform. These Likert-scale questions were followed by open-ended questions to allow the interviewee to control the responses and to provide additional comments.

The survey was composed of six sections. The first section asked about business size and scope, since it was designed to develop a detailed understanding of the company's size, background, value chain partners, key sales markets, and strategies. This section was used to identify issues that were common among companies sharing similar attributes. The second section, value chain success and hindrance factors, was designed to provide insight on the main issues that have helped to develop the company's value chain over the past number of years. Section three asked detailed questions on the companies' level of usage of MSA as both a grading and a marketing tool in the domestic and export markets. In addition, companies were asked to rate the reasons for adopting the system, as well as the benefits the system has had on their company since adopting.

Section four asked about MSA program costs. Respondents were asked to categorize the initial and ongoing expenditures of the MSA system in detail. Questions on value chain collaboration were also asked in regard to cost sharing. This section also allows the company a chance to critique the MSA system in general, as well as the factors that have led to industry adoption (or lack of). Section five further develops an understanding of how the companies have chosen

to develop value chain relationships and how the implementation of MSA has helped to develop these relationships. This section also determines the key issues that the company faced when deciding whether or not to make the initial decision to adopt the MSA program and make the corresponding investments. The last section explores information flows between the company's interfaces with members immediately upstream and downstream.

Table 4.1 Survey Overview, Value Chains

	# of Questions	Description of Research
Section 1: Business Size and Scope	6	This section asked about business size and scope, background, value chain partners, key sales markets, and strategies.
Section 2: Value Chain Success and Hindrance Factors	3	This section asked about value chain success and hindrance factors.
Section 3: Meat Standards Australia Perceptions and Adoption	7	Section three asked detailed questions on the companies' level of usage of MSA as both a grading and a marketing tool in the domestic and export markets, the reasons for adopting the system, and the benefits the system has had on their company.
Section 4: MSA Program Cost	11	Section four asked about initial and ongoing expenditures of the MSA system in detail, as well as questions on cost sharing within the value chain.
Section 5: Value Chains	13	Section five further develops an understanding of how the companies have chosen to develop value chain relationships and how the implementation of MSA has helped to develop these relationships.
Section 6: Information	5	Section six explores information flows between the companies' interfaces with members immediately upstream and downstream.

Source: Author's own survey and analysis.

4.4.4 Company Cases: Overview of Key Characteristics

The following table (table 4.2) describes the sample used for this analysis. On average, firms had 110 full time employees (ranging from seven to 294) and 14 part time employees (ranging from 22 to zero). The largest two companies felt that their volume justified an export license, while the smallest three currently do not export. The primary business for the largest three firms, as measured by employee time, was packaging and processing, while the smallest two firms contracted their processing and had the largest share of their operations in retailing. The following sections present the different business models of the five value chain interviews, focusing on the role of MSA in each case.

Table 4.2 Descriptive Statistics of Case Study Population

Case Number	1	2	3	4	5
Number of full time employees	294	150	70	27	7
Number of part time employees	18	0	10	23	22
% of total production that is MSA graded	60	85	100	95	100
% of total revenue graded and marketed MSA	45	60	10	90	0
Export	Y	Y	N	N	N

Internally Owned Processes					
Beef Production	Y	N	N	N	Y
Lot Feeding	Y	N	N	N	N
Packaging and Processing (incl value adding)	P	P	P	Y	Y
Wholesaling	Y	N	Y	N	N
Retailing	N	N	Y	P	P
Food Service	N	N	Y	N	Y

N (No) – process is not internally owned.

Y (Yes) – process is internally owned.

P (Primary Business) – process is company’s primary business as measured by employee time.

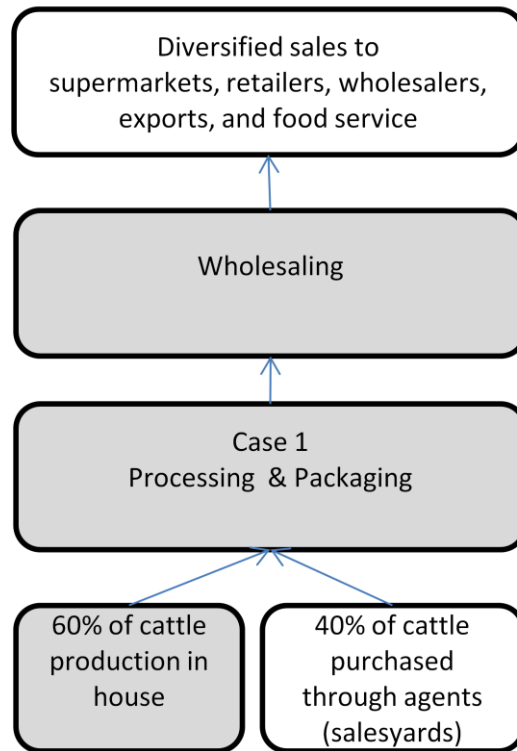
Source: Author's own survey and analysis.

Case 1

Case 1 is the largest company of the five chain captains in this study, employing just fewer than 300 full-time and approximately 20 part-time employees. The company has a high degree of vertical integration from the farm to the wholesale level. Approximately 80% of their revenues are generated from the sale of beef in the domestic market with the other twenty percent going to a number of export markets. The company previously had around 80 % of their

production going to one major supermarket. After having a negative experience with this reliance on one customer, the company has moved to a more diversified sales mix in terms of customers, including supermarkets, retailers, food service, and the export market.

Figure 4.1 Case 1 Organizational Chart



Case 1 has a high degree of vertical integration with 60% of cattle being produced in house and having an in house wholesale division. The remaining 40% are purchased through agents (sale yards). Given they are less reliant on producers for their supply they also tend to have less integration and communication between them and producers with no formal information being fed back to producers. At the other end of the company's business they do most of the distribution of their product, having 16% of their staff engaged in wholesaling. See figure 4.1 for an

overview of the value chain structure of Case 1. In all five organization charts (figure 4.1 – 4.5) the shaded area indicates internal ownership of the processes.

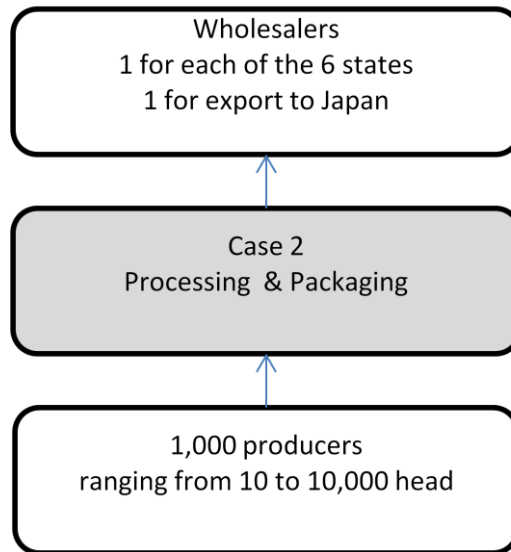
Case 2

Case 2 (see figure 4.2) is a meat processing business and is the least vertically integrated of the five companies in this case study. The company is the second largest with its processing facilities employing approximately 150 full-time employees. The company does not own operations either up or down the chain from their core processing operations, but has marketing relationships with other chain members. Approximately half of their revenues are generated from the sale of beef in the domestic market and half to export markets common to Australian processors.

Just under of 100% of cattle are purchased directly from approximately 1,000 producers, ranging from very small to up to 10,000 head. These relationships have been in place for many years with a large number of the producers having Case 2 as their only point of sale. At the other end of their production facilities the company sells directly to wholesalers which are not controlled by Case 2. Wholesalers are typically the sole distributor for Case 2 for a single state within Australia or for a single country in the export market. The company's processing facilities are strategically placed in locations that are easily accessible by their target producers, allowing them to source directly from farmers. The trade-off of this is that very little product is sold within the local state. The company spends a significant amount of resources trying to build and

maintain these relationships. For example, the company holds an open forum twice a year where between 50 and 100 producers attend. These are partially meant to encourage open communication as well as to educate producers. Recently, MSA has been involved in these meetings.

Figure 4.2 Case 2 Organizational Chart



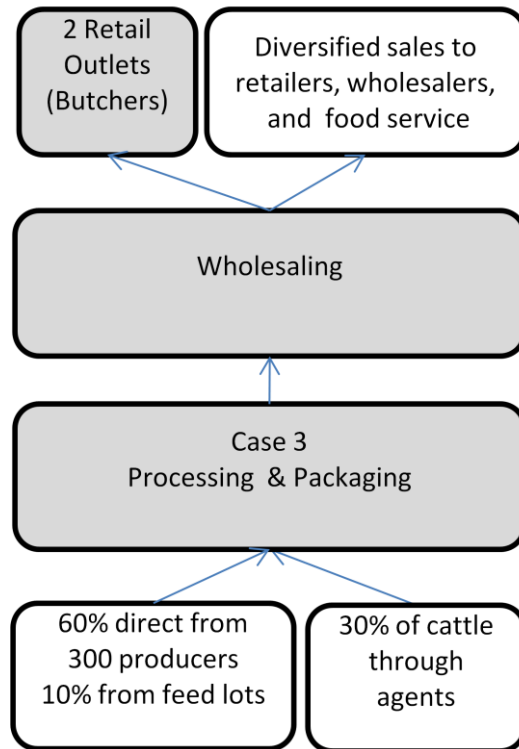
The company has two quality brands that are underpinned and labelled with the MSA grading system. Eighty-five percent of the Case 2's production is MSA graded, with 60% marketed (labelled) with the MSA logo.

Case 3

Case 3 (see figure 4.3) sits in the middle of the spectrum in regard to both size and level of vertical integration. The company employs 70 full-time and 10 part time employees. The company's core business is processing and packaging, with operations extending to wholesale and to two butcher shops. All of the

company's revenues are generated from domestic sales, as the company does not feel that its volume is large enough to justify the costs associated with an export license.

Figure 4.3 Case 3 Organizational Chart

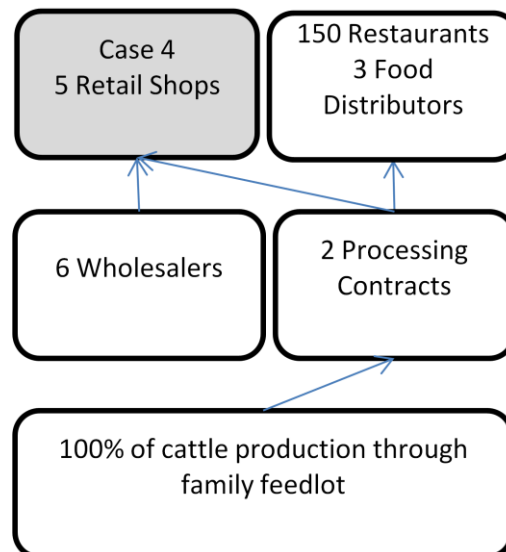


Sixty percent of the cattle are sourced directly from over 300 producers and 10% come from feedlots. Although the company recognizes an increased profitability of directly sourced animals over sales yard animals, the company still obtains approximately 30% of its cattle from sales yards. Case 3 grades 100% of the beef product, but only markets its top brand with the MSA claim. This brand accounts for about 10% of the company's gross revenue.

Case 4

Case 4 (see figure 4.4) has operations that range from cattle production to retail, with retail being their core business. The company has 50 employees, half of which are full-time and half-part time. The majority of the company's employees are based out of their five beef retail shops. One hundred percent of cattle are sourced internally from a family-owned feedlot. These cattle then go through contract processing facilities. Case 4 then receives their own product from the processor, adds value, and distributes to food distributors, restaurants, and to their own retail shops.

Figure 4.4 Case 4 Organizational Chart



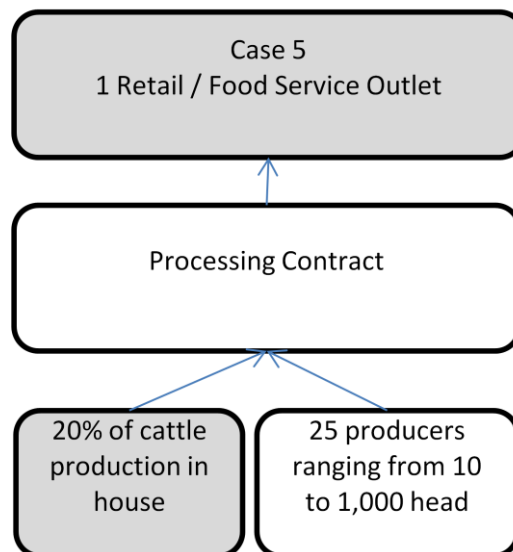
The company currently generates 100% of its revenues from the domestic market. Its retail product offerings are made up of the company's own MSA brand, as well as branded products sourced from a number of well known Australian meat suppliers. Ninety five percent of the product is MSA graded. The

reasons for the other five percent are due to the processing of cows and bulls which the company does not grade. All products that pass MSA grading are labelled and marketed as MSA graded.

Case 5

Case 5 (see figure 4.5) is the smallest of the five companies in this study, with seven full-time and 22 part-time employees, but is among the most vertically integrated, having operations that extend from cattle production to a retail shop. In order to substantiate the company's claim of sustainability and animal welfare, the company sources cattle either from their own farm (approximately 20% of production comes from in house) or directly from local producers that share their values (approximately 80%). Processing is done through a contract processor. The company then gets its own product back, and adds value before sending it to its retail shop.

Figure 4.5 Case 5 Organizational Chart



The company does not currently export, with the majority of its revenues coming from its own retail shop. The whole business concept is structured around MSA and MSA philosophies. The company thus grades 100% of the products it sells, but does not label it as such.

4.5 Measuring Against Best Value Supply Chain Competitive Priorities:

Quality, Speed, Flexibility, Cost

“Quality refers to the relative reliability of chain activities” (Ketchen et al., 2008, p. 236). Many advocates of MSA suggest that MSA directly provides a more consistent product, and as both upstream and downstream players adapt, the system leads to better quality products. *“Previous attempts at grading schemes, which professed to sort carcasses on eating quality, generally accounted for little variation in palatability when tested by consumers”* (Polkinghorne, 2008b, p. 48). *“Unlike existing industry description systems, MSA accurately predicts eating quality for individual beef muscles”* (Meat and Livestock Australia, 2009). The grading system represents the best existing example of a total quality management grading approach for improving beef quality and palatability (Smith et al., 2008). This was confirmed during the company interviews. All five firms mentioned product consistency as either a factor that lead their firm to implementation or as being one of the main benefits to their business of utilizing the MSA grading system. Two of the five companies were developed after the creation of MSA, as they felt it provided an opportunity for them to develop a business model around their branded product. The other three companies claimed that the model helped to develop quality (and thus a quality perception) in their brands. These findings

support prior claims that the implementation of the MSA grading system increases product consistency and quality.

“Speed [often referred to as cycle time] is the time duration from initiation to completion of the supply process” (Ketchen et al., 2008, p. 236). Given the grading system adds extra steps to the production process one could hypothesize that it creates a time lag in the production process. In order to test this, the processor survey directly asked participants to what extent they agree that the implementation of the MSA grading system has improved logistics speed. On a five point likert-scale three companies checked neutral, one disagree, and one strongly disagree. This suggests that the grading system slows down the supply process. The following were some of the reasons provided:

“MSA adds to the number of production changeovers required in the facilities. This requires a time cost to clean out the boning room”

“MSA adds more categories of beef, and in an abattoir you want to have as few of categories as possible, which make the abattoir less efficient”

Ketchen and Hult (2007) define flexibility as a supply chain’s responsiveness to the consistent and changing needs of its users. When asked to what extent companies agreed that the implementation of the MSA grading system improved responsiveness to changes in customer needs, a common theme did not emerge in the results. This suggests that the implementation of MSA does not

have a significant effect on the chains' responsiveness to the consistent and changing needs of its users.

In order for a processor to implement the MSA grading system it must incur initial costs. These costs come in the form of equipment, technology, extra staffing and training, advertising and promotion, and research and development. The companies' biggest initial expenditure varied between the individual companies. The smaller companies, with a focus on the end consumer, tended to have spent a large percentage of their initial investment on research and development, and advertising and promotion. The larger companies, with a higher portion of their business as a processing facility, spent the majority of their initial implementation costs on equipment and employee training. On an ongoing basis, the largest expenditure category for four of the five companies was investment in training and staffing. In most cases the discussions revealed the largest cost in this category to be the cost of maintaining the grading work force (training of new graders, and regular and overtime of graders). Companies were also asked to rate how important a number of problems and obstacles were for slowing down or causing problems for their value chain expansion. "High costs of implementing MSA" was either not at all important or of little importance for the smaller companies. Surprisingly, the largest and second largest companies noted that the "high costs of implementing MSA" was very important (major problem) and important, respectively. The responses to this question follow with the level of investment into equipment and employee training required of processors of this size.

When asked to indicate the degree of impact utilizing the grading system had on reducing costs, three companies checked that the system had a low impact at reducing costs, while two checked worse off. Participants were also asked the extent that the implementation of the MSA grading system impacted their internal logistics costs. When asked the level of agreement on a five point likert-scale that the implementation of the MSA grading system has improved internal logistics costs, responses were relatively varied, with one company checking somewhat agree, two neutral, one somewhat disagree, and one strongly disagree. One company suggested that some of the direct costs would be offset by increased efficiencies in other areas. Four of the five companies did not believe that “high costs of meeting on going MSA grading requirements” was an important obstacle for slowing down or causing problems for their value chain expansion.

When participants were asked about their views on the driving force behind non adopters, responses varied to the view that “costs of adopting MSA are too high” was a strong contributing factor (two – very important / problematic, one – moderately important / problematic, two - unimportant). In addition, the majority of companies did not consider the costs of implementation as excessive. In summary, the views on costs seem to be somewhat mixed. Although the largest two companies noted that the high cost of implementation were important factors in slowing down chain expansion (and high costs as a factor for the non adopters), the majority of companies did not see the initial investment required as being problematic or excessive.

4.6 The Extent and Role of Collaboration

The above companies were asked to rate the impact of MSA on “increased chain collaboration”. This rating was motivated, since it was expected that improving supply chain processes requires increasing chain collaboration and communication. In this study, the level of (or transition toward) mutual decision making, cost sharing (that relate specifically to MSA), sharing of MSA premiums, and profit sharing are used as proxies of integration and coordination. On the most fundamental level companies were directly asked to rate the impact of MSA on “increased chain collaboration”. *“Supply chains that stress quality continually focus on improving their supply chain processes to increase product reliability and customer satisfaction”* (Ketchen & Hult, 2007, p. 575). Improving supply chain processes starts with increasing chain collaboration and communication. In a more general context, Handfield and Nichols (1999) suggest that until recently, organizations have focused primarily on their direct customer, placing relatively little emphasis on either other organizations within the supply chain network or the end customers. Most recently, *“...the [Australian beef] industry has evolved from a disorganized, commodity-based system, with low-quality output and focused on farm production, into a more organized industry composed of many supply chains with shared incentives, defined roles and focuses on high quality to respond to the standards demanded in overseas and domestic markets”* (Morales, 2008, p. 2).

Three of the five firms claimed to have seen an increase in chain collaboration as a result of using MSA, while two firms noted no change. Four firms noted that the implementation of the MSA grading system lead to increased

communication with chain members. No respondents noted that MSA had a negative effect on chain collaboration.

Each company appeared to also be making business decisions independently, and not in collaboration with the other members of their value chain. The only decisions that were identified as being mutually agreed were decisions on packaging and infrequently on new product development (Case 3). Case 4 also had input into the length of time on grain and supply smoothing from the feedlot. The smallest company noted that collaboration on supply planning (smoothing or seasonality) would be of benefit to both the producer and the end retailer. The implementation of the MSA grading system did not have an effect on moving toward more coordinated decision making.

Although none of the five companies interviewed directly shared the financial costs of MSA with their business partners, four companies did share the financial premiums. For example, these four companies pay a premium back to the producer when the individual carcass passes MSA grading. The largest company did not pass the MSA premiums back to the producers. This was a result of their high level of vertical integration, with any supplemental cattle coming through agents. But with companies paying based on value (sharing financial premiums), it can be said that the implementation of MSA is providing a platform for moving toward a more integrated approach. And, *“...according to economic theory, these annual gross benefits are eventually distributed to producers, wholesalers, retailers and consumers in relation to the relative slopes of the demand and supply curves at all the various market levels, as the markets adjust*

over time to the new level of consumer willingness-to-pay for guaranteed tenderness” (Griffith et al., 2010, p. 10).

4.7 Information Sharing

The innovations in information technology, increasing customer demands in areas of product quality and safety, and the emergence of new forms of inter-organizational relationships have been a catalyst to allow for the emergence of an integrated supply chain approach (Handfield and Nichols, 1999). When partners choose to participate, information can cost effectively be available to any party within chain. *“Point-of-sale data [can be] transferred immediately throughout the supply chain, allowing managers to spot trends, plan capacity requirements, allocate materials, and notify suppliers throughout the entire chain”* (Handfield and Nichols, 1999, p. 7). Companies in this study are not yet providing this level of information exchange. Although, it was anticipated that with MSA providing a platform for increased information exchanges, the emergence of new forms of inter-organizational relationships and new technologies would enable the emergence of more integrated supply chains (Handfield and Nichols 1999), with a subsequent increase in value chain performance.

Each member must have the information that is required by the decision makers in each link to effectively make decisions that are in line with the mutual goals of the chain. But in order to provide such information, each member of the chain has to perceive that they will benefit at least as much from the information they receive than the cost and time required of them to provide their proprietary

information to other members of the chain. Participants were directly asked to what extent that they agree with the following statement:

“I benefit at least as much from the information I receive from the other chain members as the cost and time required of me to provide information to the other members of the chain.”

Responses varied between strongly agree (Cases 2 and 3) and somewhat disagree (Cases 1, 4, and 5). Three companies therefore feel that the cost and time required to provide information to other members of the chain is greater than the benefit from the information they receive.

Schroeder (2003) provides an outline of the desired categories of information that are necessary at each level. Cow-calf producers rely on seed stock suppliers to provide accurate and reliable information regarding breed, quality attributes, etc. Feedlot operators rely on information from the cow-calf operators in regard to preconditioning, vaccination programs, quality attributes, etc. Processors rely on information on cattle quality, and yield expectations. The list goes on all the way to the end consumer. Note that the information does not only go one way. For example, information from feedlots regarding detailed feeding and slaughter performance allows the producer to make better decisions and attempt to produce desired attributes. The level of information flow within the individual interfaces varied greatly between the companies in this study. At the one end of the spectrum, the smallest company provided a vast amount of

information back to the producers. An analysis of what makes up the individual value of the animal is provided to producers, but the company did admit that many producers lacked the knowledge required to use it. The suggested solution was to eventually hire a full-time producer consultant to work with and educate producers on how to increase the value of their animals. A recent survey by MLA claims that 85% of cattle producers have at least a fairly good understanding of the MSA program and while only 40% of cattle producers have attended workshops/events, 89% get a lot or some value from them (Meat Standards Australia, 2009). This same survey finds 96% of cattle producers have at least a fairly good understanding of producer requirements.

On the other extreme, the largest company purchased cattle through sales yards; the producers of these animals received no information. This company did not have a focus on information sharing to producers, since 60% of their slaughter came from internal production. And almost their entire MSA graded product came from this internal production. Although the implementation of MSA did not have an effect on increasing the amount or quality of information that chain members voluntarily share, there are mandatory MSA feedback sheets. For example, producer feedback sheets provide information on 16 attributes. A recent survey by MLA revealed that 74 percent of producers find the reports to be valuable/extremely valuable (Meat Standards Australia, 2009).

4.8 Trust in Chain Relationships

Trust has been defined as “...*the inter-personal reliance gained from past experience which requires a previous engagement on a person’s account, recognizing and accepting that risk exists*” (Luhmann, 1988, p. 95). Trust is commonly cited in the literature as being critical to ensuring not only the effectiveness but also the survival of a supply chain (Zaheer et al., 1998; Holcomb and Hitt, 2007; Fischer, 2009), and has been identified as being of considerable importance when trying to get independent firms to cooperate (Kumar, 2000). “*A central premise of relational exchange theory is that personal relations generate trust and discourage opportunistic behaviour between firms*” (Zaheer et al., 1998, p. 142). The presence of trust among individuals across firms has the ability to increase overall performance, decrease the complexity and costs of negotiation, and reduce conflict (Zaheer et al., 1998). Trust and information can form a circle; Trust can be formed through open access to information sharing, while the willingness to participate in information sharing is a result of previous trust. Fischer (2009) did a study on trust levels in the meat sector supplier-buyer relationships in six European countries in order to identify the main determinants of trust. In the farmer-processor relationship Fischer (2009) found that positive past collaboration, followed by effective communication and the existence of personal bonds were positive and significant factors affecting the level of trust. In the processor-retailer relationship a positive past collaboration experience and effective communication were significant. Other studies have also found a lack of cooperation and distrust in the beef industry in other parts of the world (e.g. United

Kingdom - Palmer, 1996; Simmons et al., 2003; New Zealand - Clare et al., 2002; and Canada - Brocklebank, 2004). Two firms mentioned issues of distrust in the Australian beef industry, specifically the relationship between the producers and processors. One firm provided the following example of conduct that lead them to distrust another industry participant:

“We have had restaurants sell our brand without first buying it from us”

“Too often in the beef industry information is withheld across vertical segments because of the incentive asymmetric information provides for individual profit opportunities at the expense of someone else” (Schroeder, 2003, p. 11).

Each participant was asked whether or not they would benefit from additional information that is currently withheld by other members of the chain. The two largest companies indicated that they did not want or require any further information. The other companies noted operational information such as long term genetics selection, sire information, and age of animals as examples of information which is currently not received that would be beneficial.

4.9 Conclusions

To satisfy increasing demands for various beef attributes (search, experience, credence), and to hedge against systemic risks, the implementation of chain-wide quality management systems are regarded as possibly the most sustainable strategy. It is increasingly recognized that individual producers are no longer able to ensure the increasing range of meat quality attribute dimensions on

their own. A well-designed and executed grading system not only provides advantages to consumers, but also potentially benefits all members along the value chain through increased demand for beef. Particularly, the implementation of consumer oriented grading system can have important effects on individual companies and the industry as a whole.

This chapter aims to contribute to a better understanding of the effects of closer value chain coordination and integration on the success of beef value chain systems. The case of the MSA system is used as a benchmark and best in class approach. Based on previous work by Ketchen et al. (2008), the focus of this research is on chains that have developed farm-to-retail brand-driven value chains in the Australian beef market. The analysis is based on a cross-section of in-depth interviews with five processors and retailers in value chains of differential degrees of vertical coordination.

The analysis has focused on the concept of best value supply chains, collaboration, and information sharing and trust. Smaller companies in this study are the only ones involved in food-service, whereas the two largest firms were the only ones involved in exporting. However, given the small sample size, it is difficult to draw further conclusions regarding organizational design. Using Ketchen and Hult's (2007) best value supply chain concept as a benchmark, this research supports previous claims that the implementation of the MSA grading system increases product consistency and quality. This factor has helped companies to not only differentiate their brands, but also acted as a catalyst for two of the five companies to form. But it comes at a cost of slowing down the supply

process. Four of the five companies did not believe that “high costs of meeting on going MSA grading requirements” was an important obstacle for slowing down or causing problems for their value chain expansion, and the majority of companies did not consider the costs of implementation as excess. The implementation of the grading system therefore had positive implications on these companies, and came at a low cost trade off. Similar results would most likely be found within the Australian meat industry as other firms choose to adopt the grading system.

With regard to the extent and role of collaboration, implementation of the MSA grading system does not appear to have an effect on moving toward more integrated decision making. But with companies paying based on value, it can be said that the implementation of MSA is providing a platform for moving toward a more coordinated approach. The analysis presented in this paper provides evidence of how the increased information provided as a result of implementing the MSA grading system has had a positive effect on value chain coordination. The majority of companies indicated that the cost required to provide further information to other members of the value chain is greater than the benefit from information they receive from other value chain members. Therefore, in contrast to what had been expected from the literature on transaction costs, principle agent theory and best-value-supply-chains in the context of beef, these findings suggest that the MSA grading system has had a mixed effect on value chain performance. In particular, the findings suggest that MSA had a mixed effect on firms in moving toward BVSC positioning as well as increased coordination and information sharing.

This research may benefit the Australian livestock and meat industry by helping to identify barriers to further information sharing and adoption of MSA. It contributes further to the existing literature on MSA performance, costs and benefits to the industry players, and efforts to improve the understanding of the ex post effect on individual firms as well as the meat industry as a whole. However, in interpreting the above results, it is important to keep the case-study nature of this study in mind, and in particular the limited sample size underlying the above results. Other limitations include the potential for non truthful revelation of information among survey respondents, as well as inherent problems of quantifying constructs through likert questions. For example, individuals may have different perceptions and view of what constitutes trust.

Chapter 5: Consumer Awareness and Purchasing Behaviour of Meat Standards Australia Labelled Beef

5.1 Introduction

Declining per capita beef consumption has been identified as a major concern to the Australian beef industry (Griffith et al., 2010; Bindon and Jones, 2001). This trend is not unique to the Australian beef industry, and has been witnessed in other parts of the world including North America (Ferrier and Lamb, 2006; Purcell, 1989; Schroeder et al., 1998). Contributing factors include variability in eating quality (e.g. tenderness and palatability), concerns regarding health risks, declining consumer knowledge of cuts and cooking knowledge, product appearance failing to signal quality, increasing demand for convenience, and competing products outpacing beef in terms of innovation and performance (Griffith et al., 2009; Brocklebank et al., 2008; Ferrier and Lamb, 2007).

Beef markets have also been adversely affected by food safety concerns in recent years (Tonsor et al., 2007). Others have argued that the decline in beef consumption can be explained in part by the decline in beef quality relative to other competing meat products (Purcell, 1999; Schroeder et al., 1998; Lamb and Beshear, 1998; Ferrier and Lamb, 2007). Modern meat consumers are demanding an increasing variety and quality of product and process attributes (Loureiro and Umberger, 2003; Umberger et al., 2003). More discriminating consumers asking for branded and differentiated products have forced former commodity meat supply chains to focus on quality signals. For these reasons consumers are

increasingly considering package information detailing the attributes (e.g. safety, process, and tenderness attributes) of food to assist in making their buying decisions (Caswell, 1998).

With fresh meat products, consumers face uncertainty regarding the true nature of product attributes, and therefore asymmetric information is key to consumer satisfaction problems. For example, many attributes such as tenderness are difficult to verify with current quality cues before the purchase takes place (e.g. in the case of experience or credence attributes). In order to overcome such information asymmetry inherent in many fresh meat products, value chains are faced with the task of providing credible cues that signal attributes that are desired (or that counter claim negative attributes) by today's consumers. In response to such shifts in consumer demands a number of meat value chains have emerged that aim to provide a differentiated product, such as guaranteed tenderness (Dutton et al., 2007; Martinez et al., 2007; Morales et al., 2009; Griffith et al., 2010). If value chains are able to communicate to consumers important quality attributes of beef such as flavour, tenderness, nutrition, or safety then they may be able to extract more value through providing reduced uncertainty, and reduced search and information costs for consumers.

There has been a growing interest in the various techniques and vehicles available for providing information to consumers (Verbeke, 2005). One solution to address the problem of asymmetric information and for value chains to provide proper quality cues to the consumer is to provide information through public or private labelling schemes (or a combination of both). The role of labelling goes

beyond its direct influence as a shopping aid (Casswell and Padberg, 1992). Therefore, when evaluating labelling schemes it is necessary to take a broad approach and evaluate a range of implications as this chapter attempts to do (e.g. demand characteristics). Beef value chains have therefore turned to quality labels (both private and public mechanisms) in an attempt to regain consumer confidence and desire for their products. But in order to be effective, labels and the certifying entities behind them must be perceived as being credible by the users. Hence, not only the information provided but also the source providing the information must be trusted by the consumer (Eden et al., 2008).

Similarly, labelling services provided by entities that are trusted and well known by a large number of consumers will have a better chance at success in reducing information asymmetry and thus transaction costs (Golan et al., 2000). Private brands have gained much ground recently and are one of the most striking phenomena in the agriculture and agri-food industry over the last number of years (Hassan and Monier-Dilhan, 2006). The beef industry is certainly not an exception to this. Branded beef programs offer a means for differentiating beef products at the consumer level, and as a result, interest in brand marketing and recognition has increased greatly (Martinez et al., 2007). In a study of U.S. consumers Martinez et al. (2007) find that the expenditures on branded fresh beef have increased in recent years (e.g. *Certified Angus Beef*, *Omaha Steaks*, and *Nolan Ryan Beef*).

Due to the a potential lack of trust with private certification schemes, other methods attempting to communicate certain desired attributes to the consumer

include third party certification and labelling schemes (e.g. country-of-origin labelling, national grading certification labelling). Governments could intervene in an attempt to correct for market failures such as those caused by asymmetric information using such tools as taxation, education programs, and production regulation (Golan et al., 2000). Golan et al. (2000) outline the conditions where labelling may be an appropriate policy tool. Prior literature also includes evaluating the effects of advertising and media coverage of food quality and safety issues, investigating the role of trust and credibility of information sources, and analyzing consumer interest in and use of available information cues (Verbeke, 2005).

The Meat Standards Australia (MSA) grading system being an example of a third party certification mechanism. Meat Standards Australia is a meat grading system, developed by Meat and Livestock Australia in 2000, which attempts to decrease variability of meat tenderness, increasing consumer confidence, and reverse the trend of declining beef consumption. Grading systems that can provide the consumer with an assurance of a more consistent and a higher quality product have been found to provide benefits to both the consumer and to stakeholders within a value chain (McEachern and Schroder, 2004). To date there has been very little research conducted on the ex post effects that the MSA grading system has had on addressing changing consumer demands, its effectiveness as both a grading system, and as a certifying mechanism as perceived by Australian consumers. The findings of this research aim to provide industry with information

pertaining to consumers' *awareness* of the MSA grading and product certification system broken down by socio-demographic consumer segments.

Perhaps more importantly is how several socio-demographic factors determine consumers' beef *purchase decisions*. In addition to this, awareness and purchasing decisions in regard to MSA will be compared to awareness and purchasing decisions of other beef certification systems currently available to Australian beef consumers. Marginal effects on a number of independent variables (e.g. age, income, geographic, shopping habits) will help marketers to identify gaps in current branding strategies. Marginal effects are defined as the effect of an increase in the independent variable on the choice variables - awareness and previously purchase variables.

Findings of a low awareness (awareness defined by the relative number of consumers aware of the MSA label), combined with the high number of slaughters being graded, could suggest that a grading system can be successful without the need to position the system as a certified label at the consumer level. A high level of awareness could be a potential indication that the successful marketing of MSA at the consumer level has been a driver for industry adoption. Once the results to this question are provided, a relevant question is then which labelling strategy (including private versus public) best signals such quality cues to the consumer, and most demanded by the market. Meixner et al. (2007) make this research question even more interesting by claiming that "*...if a producer wants to signalize high quality it is advisable to use a combination of different quality clues: prudential application of quality labels, premium price level and clear*

traceability” (Meixner et al., 2007, p. 93). Prior studies have investigated consumer associations with, perceptions, and beliefs about beef quality labels (e.g. see table 5.2). For example, Verbeke and Viaene (1999) investigate consumer attitudes to and associations with quality labels for beef. These studies largely conclude that positive associations, perceptions, and beliefs result in favourable attitudes that can result in the potential success of a beef quality label. Frewer et al. (2004) suggest that future success from an industry perspective depends more than ever on a better understanding of the motives, perceptions, attitudes, and behaviour of consumers. Because not all consumers are alike, it is important to understand how socio-demographic characteristics affect consumer awareness and purchasing decisions (Verbeke, 2005). Below are four specific hypotheses, in this regard, that this chapter aims to address.

This chapter addresses four gaps in the literature:

- 1. Meat Standards Australia was developed in order to address two key problems: a reduced level of cut and cooking knowledge among consumers, and a high degree of variability among beef available to consumers (Griffith et al., 2010; Griffith et al., 2009; Rodgers et al., 2007; Yann et al., 1993). It is hypothesized that after experiencing MSA labelled beef, consumers will have higher confidence in their ability to select the appropriate product, and have a decreased concern about the variability among beef available.*

2. *To date there has been very little research conducted using consumer studies to directly analyse the credibility of, or consumer perception of, MSA or MLA. The research in this chapter addresses whether or not the MSA certification label is viewed as a trustworthy certification, as perceived by consumers.*

3. *The level of consumer heterogeneity in the Australian beef market implies that information is likely to be effective only when it addresses specific information needs and is strategically positioned for its target audience (Morales et al., 2009; Erikson et al., 1998; Verbeke, 2005; Killinger et al., 2004). For this reason, this research looks at how consumer awareness and purchasing behaviours differ between the numerous socio-demographic characteristics within the sample population.*

4. *Discussions with experts on the Australian beef industry commonly raised the debate on whether or not grading systems are more effective when used as a consumer marketing tool (e.g. quality label), or simply as a system to underpin private brands. This research addresses whether or not a quality label like the MSA certification label is required to be displayed at the consumer level in order to have success in the retail sector.*

The next section presents a review of literature on how labelling mechanisms, when perceived as being credible, can help reduce information asymmetry. The methodology section then details the models used in the analysis. In this section,

data, descriptive statistics, and model specifications are presented. Details on the survey that was used for data collection is then presented. In order to address the research questions previously noted, descriptive analysis, and a number of logistical regression models are used, and described in the methodology section. Descriptive analysis attempts to address whether or not the implementation of MSA has helped to address the concerns it was intended to: increase the consumers' confidence in their ability to select the appropriate product, and to decrease concern about the variability among beef available. Binary logistical regression models are used to determine factors affecting Australian consumers' awareness and purchasing behaviours. A discussion of the research findings concludes this chapter. The research results provided throughout this chapter will also provide insight for meat industries in North America, specifically the Canadian beef sector, currently struggling with similar trends of decreased consumer satisfaction.

5.2 Literature: Information Asymmetries, Market Failure, and the Role of Quality Labels

5.2.1 Economics of Information Asymmetry in Agri-Food Products

Driven by increasing consumer demand for healthier, safer, and more differentiated meat products, product labelling strategies have become important marketing tools in recent years. The use of credible labels is a predominant mechanism which allows value chains to signal quality or the presence of specific attributes, and can create the potential for price premiums needed to justify

labelling and certification efforts. Analyses of labelling issues associated with agricultural and agri-food products are frequently done to address information asymmetries and to counteract negative publicity in regard to food safety and quality (Caswell and Padberg, 1992; Caswell, 1998; Golan et al., 2000). Caswell and Padberg (1992) were among the first to discuss the possibility of labelling as an answer to imperfect information in the consumer market, suggesting that product labelling promotes market incentives with relatively limited government involvement.

Consumers will purchase products which provide them with the most value, as long as they are able to accurately judge the quality attributes (Caswell, 1998). However, with fresh meat products information asymmetry can arise due to the fact that consumers face uncertainty regarding the true nature of product attributes (Verbeke, 2005). Specifically, the most significant form of information asymmetry in food products is that sellers are better informed about quality attributes than consumers (Caswell and Mojduszka, 1996). *“Consumers can experience problems predicting the eating quality when they shop, because their inferences are based only on the appearance of the product, perceiving a high risk when they make a choice”* (Morales et al., 2009, p. 2). Consumers with different levels of risk aversion and/or preferences choose differing bundles of quality attributes based on their preferences. Categories of food product quality attributes include food safety, nutrition, package, and process attributes (Hooker and Caswell, 1996). However, if their perceptions of such risks associated with the bundle of quality attributes are incorrect, as is commonly the case with asymmetric

information, the consumer's utility for the product is decreased (Caswell and Mojduszka, 1996).

Fresh meat is particularly vulnerable to information asymmetries and quality is not easy to evaluate when consumers are shopping in-store, introducing uncertainty in the purchase decision (Morales et al., 2009). When purchasing meat, consumers evaluate the product at the store and post purchase. Fresh meat can therefore be described as having search, experience, and credence qualities. In order to maximize expected utility, a consumer will search for a piece of meat until his or her marginal expected cost of searching for that product exceeds his or her marginal expected return (Nelson, 1970). Seminal work by Darby and Karni (1973) and Nelson (1970) defined and distinguished attribute categories between search, experience, and credence qualities (Nelson, 1970; Darby and Karni, 1973; Carlton and Perloff, 1994; Steenkamp, 1989; Becker, 2000). Search attributes, such as appearance (color, size, brand) of the cut, can be evaluated by the consumer before they purchase. Experience attributes in meat products, such as taste and *tenderness*, cannot be determined prior to purchase and therefore must be evaluated ex post purchase (e.g. determined through usage or with consumption). Experience attributes have high pre-purchase costs but low post-purchase costs since quality information is obtained by the buyer as a bi-product after use, which provides information into the decision making process for repeat purchases (Becker, 2000). A moral hazard can exist for the producer who sells an experience good without a warranty to one-time consumers because there is no penalty for selling inferior products (Caswell and Mojduszka, 1996). Consequently,

producers supplying a high quality product who are unable to prove their claim will not be able to collect a price premium. Economic models attempting to correct such an issue focus on how consumers can gain information on quality prior to purchase to increase their knowledge and allow them to make a more informed decision (Caswell and Mojduszka, 1996; Casswell, 1998). Such information thus decreases uncertainty and mitigates the aforementioned loss of utility. In a repeat purchase model, information problems in markets for experience goods are therefore less relevant (Caswell and Mojduszka, 1996). Credence qualities, such as health implications, are generally not fully determined even after the product is purchased (Morales et al., 2009; Caswell and Mojduszka, 1996; Becker 2000). In this case the consumer must rely on the information provided by the retailer, media, or word of mouth.

5.2.2 Economics and Importance of Quality Labels

Labelling can be seen as an effective way to reduce information asymmetry by communicating certain attributes that have the potential to directly impact the end consumers' choices (Rimal and Fletcher, 2003; Verbeke, 2005). Essentially, information labelling schemes have the ability to transform experience attributes into search attributes, allowing the consumer to gain confidence in their pre-purchase judgement (Caswell, 1998; Caswell and Mojduszka, 1996). Quality labels or private branding can be a way to signal to the consumer such attributes, and differentiate the labelled product from the otherwise similar unlabelled product (Golan et al., 2000). Meixner et al. (2007) note that the use of labels is

connected with several important advantages, including simplicity of usage, reduction of information, and traceability.

Labels are extrinsic information cues that can assist consumers in inferring product quality or other attributes, and increased uncertainty and perceived difficulty to evaluate quality can increase the consumers' usage of such cues (Verbeke and Ward, 2006; Stranieri and Banterle, 2009; Verbeke and Roosen, 2009; Morales et al., 2009). *“Through their signal value and visibility on product packages – similar to the case with brands – such labels may reach the status of a search cue, ie., an information cue that consumers actively search for during their shopping and purchasing decision processes”* (Verbeke and Roosen, 2009, p. 22). Labels can thus decrease consumer information costs (Stranieri and Banterle, 2009; Verbeke, 2005). And in cases where uncertainty about the quality or safety of a product is elevated, labelling information can become more dominant as a means to infer product quality (Verbeke and Roosen, 2009).

Previous studies are not unanimous with respect to whether labelling cues have a favourable impact on product valuation or purchasing characteristics of consumers (Verbeke and Roosen, 2009; Meixner et al., 2007). A consumer's gain from being provided with additional information depends on their relative transaction costs (e.g. search or information costs) for being informed, among other things, such as risk preference, or level of prior knowledge (Caswell and Mojdzuska, 1996). For example, consumers who attach little value to a particular quality attribute may choose to ignore information provided (Caswell and Mojdzuska, 1996). In such a case the marginal cost of providing this information

could be larger than the marginal benefit to the consumer. Meixner et al. (2007) state that quality labels on beef are not as important for the buying decision of consumers as many would think. While Stranieri and Banterle (2009) find that most consumers believe labelled information to be very important when purchasing meat. Verbeke and Ward (1999) also find consumers recognize problems evaluating beef and indicate a need for reliable quality labels. Similarly, other studies suggest that labelling has been underutilized for communicating the safety and process attributes of food products (Caswell, 1998). Other studies have also shown information on food labels to have made an impact on consumers' food selection decisions (Rimal and Fletcher, 2003, referring to Larsson and Lissner, 1999; Shine et al., 1997; Wandel, 1997). From this it becomes evident that an extrinsic quality cue from a quality label is appropriate for supporting consumer product choice decisions while shopping for food products.

5.2.3 Private and Public Labelling Schemes

Private brands have gained much ground recently and are one of the most striking phenomena in the international agriculture and agri-food industry over the last number of years (Hassan and Monier-Dilhan, 2006). Consumers typically assume (whether perceived or reality) branded products offer an increased level of quality (Dutton, et al., 2007). Private companies will have an interest in the use of voluntary labels as a means of differentiating their products to consumers (Martinez et al., 2007; Caswell, 1998). The beef industry is certainly not an exception to this. For example, Ferrier and Lamb (2007) estimate approximately 7% of US beef to be branded. Branded beef programs offer a means for

differentiating beef products at the consumer level, and as a result, interest in brand marketing and recognition has increased greatly (Martinez et al., 2007). It is in the best interest of profit maximizing firms to voluntarily communicate to consumers, and to potential consumers, the positive attributes of their products. Such profit maximizing private firms will add more information (e.g. labels) on product packaging so long as the marginal benefit (additional revenue) of each additional piece of information is larger than the marginal cost of providing such information (Golan et al., 2000). Consistently, studies in the U.S. have demonstrated evidence that retail beef brands command a price premium when compared to unbranded products (Dutton et al., 2007). When other firms are marketing with certain claims (e.g. tenderness) those who do not may lose market share. As information about product quality increases, firms will compete for market share, increasing overall quality of product available in the market. In a study of U.S. consumers, Martinez et al. (2007) find that the expenditures on branded fresh beef have increased in recent years. In this same study brands such as *Certified Angus Beef*, *Omaha Steaks*, and *Nolan Ryan Beef* are cited as successes in the U.S. market in regard to communicating certain desirable characteristics of their products. Morales et al. (2009) refer to *Australian Agricultural Company*, *Northern Australian Pastoral Company*, *Heytesbury Beef*, *Sidney Kidman and Company*, and *Twynam Agricultural Group* as large beef companies in the Australian market that focus on strengthening their company brand through guaranteeing the quality of their beef products.

Due to the potential lack of trust with private certification schemes, other methods attempting to communicate certain desired attributes to the consumer include third party certification and labelling schemes (e.g. country-of-origin labelling, national grading certification labelling). Third party labelling schemes can be provided by such institutions as consumer groups, producer associations, private third-party entities, and national and international governmental or non-governmental organization (Golan et al., 2000). Following the emergence of BSE in Germany, industry representatives from farming, meat processing, and retail sectors joined together to establish an industry led national quality assurance scheme, Quality and Safety. Quality and Safety was established for beef and pork, and combines elements of a voluntary industry led quality assurance scheme and a publically mandated set of food safety regulations (Steiner, 2006). The U.S. government has used information labelling as a means of shaping consumer knowledge, purchasing patterns, use practices, as well as manufacturers' product offerings and marketing practices (Caswell and Mojduszka, 1996). Governmental regulation may be required to improve quality signals when the market for the desired information is not properly functioning via private incentives. In recent years government intervention in labelling has been prevalent in influencing individual consumption choices to align them with social objectives such as nutrition and diet deficiencies (Golan et al., 2000). Caswell (1998) notes that the target of such regulatory regimes is to ensure a certain level of important quality attributes or to prevent consumer deception (Caswell, 1998). This would suggest that food quality and information about food quality may have characteristics of a

public good (Caswell and Mojduszka). This chapter focuses on information asymmetries in regard to beef tenderness and quality between the various chain links that exist from the farm to the consumer. Such attributes do not have broader social welfare or externalities associated with them, and for that reason, economic or political theory would not justify a government mandated labelling scheme.

Third party services for private, voluntary, labelling can help overcome the credibility perceptions of a private system, thereby facilitating market transactions and increasing market efficiency (Golan et al., 2000; Caswell, 1998). The primary services that third party entities can provide to help strengthen the credibility of a labelling claim are standard setting, testing, certification, and enforcement (Golan et al., 2000). Meat Standards Australia is an example of a private and voluntary scheme (that is independently certified and monitored), where compliant users of their grading system are allowed to carry their label. The MSA grading system has established an option for an MSA brand which users can carry through to the retail level, enabling consumers to identify the eating quality in terms of tenderness of the product (Griffith et al., 2009).

5.2.4 Information Proliferation and Marketing Strategy

In the above section it was implied that “...*labels may increase consumer welfare through providing better consumer protection, and enabling choice to be better in line with preference, while potentially generating economic rents to producers or manufacturing groups*” (Verbeke and Ward, 2006, p. 453). However, information overload can lead to consumers’ confusion or lack of

interest, leading to a consumer that does not consider all the information on the food product (Stranieri and Banterle, 2009; Golan et al., 2000). The findings of Meixner et al. (2007) support this by claiming that the abundant application of quality labels on the same product leads to irritation and confusion of consumers, and as a result, does not increase trust toward the product. A number of other studies suggest excess or irrelevant information may yield ignorance, boredom, or impatience from non-understanding, which may deter consumers from making optimal decisions (e.g. Verbeke and Viaene; 1999, Salaun and Flores, 2001; Verbeke, 2005). In this case consumers only use some of the available information because of high opportunity costs of information processing. Such overcrowding of information on product packaging is referred to as label proliferation (Lohr, 1998). *“Nevertheless, several studies had previously demonstrated that meat quality labels can be effective in terms of improving consumers’ meat quality perceptions”* (Verbeke, 2005, p. 360 referring to Verbeke and Viaene, 1999; Herrmann et al., 2002; Roosen et al., 2003).

A clear and persistent marketing strategy has been found to be indispensable in achieving the considered objectives of a quality label, and is therefore critical for success (Meixner et al., 2007). Verbeke and Ward (2006) find that the value consumers place on quality labels could be changed positively through the use of information campaigns. Thus traceability and control systems supporting a grading and labelling scheme are clearly neither the sole nor sufficient conditions for success (Verbeke and Viaene, 1999). An effective marketing communication supporting the features and benefits of the product

containing the quality label is the next hurdle to take (Verbeke and Viaene, 1999). This suggests that marketers need to take a longer term perspective, such that quality must be signalled in a repeat purchase game through consistently providing a consistent or high quality product to the consumer (Shapiro, 1983). Information problems in markets for experience goods may be mitigated if consumers are able to make repeat purchases of the same product (e.g. brand, quality certifying label) where their choices are based on prior experience (Caswell and Mojduszka, 1996). In such a model, firms producing a more consistent and higher quality product would increase market share at the expense of firms producing lower quality products (Caswell and Mojduszka, 1996). Similarly, Becker (2000) states that reputation is a means of reducing the quality erosion inherent in experience quality attributes. This chapter later argues that this is accomplished by the MSA system.

5.2.5 Consumers' Willingness-to-Pay for Beef Attributes

“Economic theory suggests that individuals who experience utility gains as a result of quality improvements are willing to pay a price premium, which signals their ‘willingness to pay’” (Enneking, 2004, p. 4). Consumer market demand is expressed by their willingness-to-pay for higher levels of quality attributes (Caswell, 1998; Caswell and Mojduszka, 1996). Building on this, there have been many studies looking at consumers' preferences and willingness-to-pay for various attributes of beef and other meat products. For example, a number of studies have found that consumers value leanness as an important selection criterion (Forbes et al., 1974; Jacobs et al., 1977; Killinger et al., 2004). Killinger et al. (2004) find that most consumers prefer low marbling and bright, cherry red coloured steaks.

This same study finds that consumers are willing to pay more to purchase steaks when receiving a steak with their preferred attributes. See Hanagriff et al. (2009) or Tonsor et al. (2007) for a further list of studies that have investigated what consumers are willing to pay to avoid or obtain various food attributes.

Many authors claim that beef tenderness is an important, if not the most important, quality attribute to beef consumers (e.g. Schroeder et al., 2008; Lusk et al., 1999; Glitsch, 2000; Becker, 2000; Dikeman, 1987; Miller et al., 1995). It is not surprising then, that further studies have shown that consumers are willing to pay a premium for more tender beef. Table 5.1 below lists a number of these studies. Guaranteeing a good eating experience in terms of tenderness should therefore be a top priority of the beef industry. For example, Rodgers et al. (2007) found that MSA graded beef (guaranteed tenderness) consistently attracted premiums of 29 cents/kg (carcass weight equivalent) at the wholesale level and 39 cents/kg at the retail level above non graded beef. Lusk et al. (1999) claim that the beef industry would gain by marketing products containing objective tenderness labels because it could capture more consumer dollars to be divided across industry participants. Labelling may not always influence demand enough to make it worth the cost (Golan et al., 2000), therefore a consumer-oriented approach and a quantification of willingness-to-pay is an important first step when designing grading systems and subsequent labelling schemes. If consumers are not willing to pay a sufficient amount to guarantee the quality of a tender product, then engaging in such an activity simply leads to wasted resources.

Table 5.1 Consumer Willingness-to-Pay for Beef Tenderness

Reference	Country	Willingness-to-Pay Findings
Rodgers et al., 2007	Australia	MSA graded beef (guaranteed tenderness) consistently attracted premiums of 29 cents/kg (carcass weight equivalent) at the wholesale level and 39 cents/kg at the retail level above non graded beef.
Lyford et al., 2009	Australia	Consumers valued MSA 4 and 5 star products at 1.5 and 2.1 more times the WTP value assigned to 3 star products.
	Japan	Consumers valued MSA 4 and 5 star products at 1.7 and 2.9 times more the WTP value assigned to 3 star products.
	United States	Consumers valued MSA 4 and 5 star products at 1.6 and 2.4 times more the WTP value assigned to 3 star products.
	Ireland	Consumers valued MSA 4 and 5 star products at 1.5 and 2.0 times more the WTP value assigned to 3 star products.
Shackelford et al., 1999	United States	Over half of supermarket consumers would pay 50 cents more per pound for a tender steak over a tough steak.
Boleman et al., 1997	United States	95% of consumers are willing to purchase the highest tenderness level offered when able to select from three products of increasing tenderness and price differentials of 50 cents per pound.
Lusk et al., 1999	United States	51% of consumers are willing to pay an average premium of 1.84 dollars per pound for a tender steak.
Parcell and Schroeder, 2007	United States	An average price premium of 1.08 dollars per pound associated with an Angus branded product compared to a store brand.
Schroeder et al., 2008	United States	Premium of 1.82 dollars per pound for products that have a tenderness assurance associated with them.

So far this chapter has attempted to lay out the vast literature that suggests it is currently difficult for consumers to predict the eating quality at all times with the cues available in-store. And as the perceived risk (or variation in product quality) increases, so will the willingness-to-pay for a labelling scheme that guarantees product quality (Morales et al., 2009). *“Establishing and managing a watertight traceability and control system with a quality label as a guarantee can be the key success factor in regaining image”* (Verbeke and Viaene, 1999, p. 61). This is what MLA attempts to achieve with the MSA grading system; a system that scientifically provides a higher correlation of eating quality than traditional carcass based systems.

Martinez et al. (2007) note that consumers search out specific branded beef products as they expect a higher quality and are willing to pay a premium for them. But it is important to note that branded products (such as those in the value chain survey detailed in the previous chapter) already claim to have superior quality. The branded products in the study conducted in the previous chapter may already have an impact on reducing information asymmetry. Therefore, the effect of a quality label is hypothesized to have a lower effect on these products than they would on generic brands (Enneking, 2004). The study by Hassen and Monier-Dilhan (2006) is relevant to this chapter, as it looks at the implications of combining a public quality label with a private brand on several food products. Their findings suggest that selling products carrying a public quality label under a private label does not lead to a devaluation of the public label, disputing prior

claims that reluctance to commercialize public quality labels under a private label is unjustified.

5.3 Meat Standards Australia as a Quality Certification

Meat and Livestock Australia provides research and development, marketing and market information to benefit the red meat industry in Australia (Meat and Livestock Australia, 2009). Prior research on MSA has focused on the drivers behind the grading system, including the science, the willingness-to-pay for beef quality grades, consumer assessment, and ways for optimizing returns in the supply chain (e.g. Polkinghorne, 2008). Previous chapters in this thesis undertake in-depth interviews with industry experts and stakeholders to analyze the effects of the MSA grading system as part of a system-wide information sharing system on supply chain development. In an attempt to better understand and quantify the effects of the MSA system on coordination and value chain creation in the Australian beef industry, this empirical approach is based on a case-study analysis of MSA stakeholders and their value chain approaches. But an understanding of consumer uptake, awareness, and purchasing behaviours ex post roll out is still missing in the economic literature.

“Certification may be defined as a process whereby an unobservable quality level of some product is made known to the consumer through some labelling system, usually issued by a third independent party” (Auriol and Schillizzi, 2003, p. 3). Other examples of certifying grading systems include the Canadian Beef Grading Agency and the USDA beef grading system. Perhaps the

most important distinction (and innovation) between the MSA grading system and other grading systems is that MSA assigns a grade to a specific piece of beef rather than to the entire carcass. This characteristic is important as it is seen as an innovation to other grading systems such as those in the U.S., Canada, and Korea, which assign a quality grade to the entire carcass after considering a limited number of traits available at the time of grading the chilled carcass (Watson et al., 2008). Earlier implementations of the USDA grading system have been criticized for creating a moral hazard problem in which producers were compensated for producing larger cattle, but not for quality improvements (Ferrier and Lamb, 2007). Other authors have criticized the USDA grading system for its ineffectiveness at identifying tenderness (Savell et al., 1987; Ferrier and Lamb, 2007). However, evidence from the interview results presented in chapter four of this thesis finds that information provided by the MSA grading system has the ability to be a catalyst for value based pay – providing an incentive for all value chain members to produce the desired attributes. Although more complex than North American systems, the MSA grading system places a greater emphasis on eating quality (Lawrence, 2002).

Tenderness cannot traditionally be fully evaluated by a consumer prior to purchase (because it is an experience attribute), but can be verifiable ex post purchase. Therefore, the role of MSA is largely to transform an experience attribute (tenderness) into a search attribute, thereby reducing search costs for the consumer. This chapter argues that MSA aims to differentiate a product, versus counteracting negative claims such as those brought about through food safety

crisis. If such a system can effectively change the beef quality and provide the consistent tenderness asked for by the market, consumer demand should rise.

Chapter four provides details on how five companies are utilizing MSA to help build their brand. Similarly, Griffith et al. (2010) present two retail supply chains (*Polkinghorne's*, and *Richard Gunner Fine Meats*) that have developed vertically integrated value chains based on the MSA system in order to provide a consistent product to the end consumer. For example, *Richard Gunner Fine Meats* uses MSA as a farm management tool, as a quality assurance system, and as a marketing advantage in both the retail and wholesale markets (Griffith et al., 2010).

5.4 Methodology

Logistical regression models have been used as a primary tool in analyzing consumer behaviour. Logit and probit regression models are both common framework used in econometric applications (Greene, 2003). The probit model assumes a normal distribution, whereas the logit model assumes a logistical distribution. Table 5.2 below lists a number of studies that have used logistical regression models for analyzing consumer perceptions in the beef industry. Erikson et al. (1998) use logistical regression models to examine the importance of beef cut characteristics in the U.S., Australia, Japan and Ireland. For example, they regress a number of demographic and product characteristics on consumer purchasing decisions. In this chapter binary logistical regression models are used in an attempt to directly address the degree of heterogeneity among the Australian

beef consumer population, looking at how consumer awareness and purchasing behaviours differ between numerous socio-demographic characteristics. This model works well with how the survey was designed, which asks respondents to check whether or not (binary) they are aware of (or have previously purchased beef products with) the MSA certification. More specifically, in the below models, awareness of the MSA label (yes / no) and having previously purchased a beef product containing the MSA label (yes / no) are the dependent variables. LIMDEP 9.0 was used for data analysis.

Table 5.2 Previous Literature on Consumer Perceptions

Reference	Data Collection	Sample Size	Methodology	Description of Research
Hanagriff et al., 2009	Survey; Online	502	Descriptive Analysis	To identify which decision variables are most influential when consumers purchase branded beef products. (United States)
Stranieri and Banterle, 2009	Survey; Telephone	1025	Logistical Regression	To analyse whether information on meat labels can be considered a useful instrument for consumers, facilitating the verification of quality. (Europe)
Sepulveda et al., 2008	Survey; Interview	364	Logistical Regression	To identify the factors associated with purchase of quality labelled beef. (Spain)
Verbeke and Ward, 2005	Survey; Interview	278	Ordered Probit	To determine which information cues on beef labels attract consumer interest, focusing on indications of quality through a quality label and quality guarantee, and on indications referring to mandatory beef labelling. (Europe)
Roosen et al., 2001	Survey; Mail	76, 43, and 105	Double Bounded Logistical Regression, Ordered Probit	To analyse consumer preferences for alternative beef labelling programs. (France, Germany, United Kingdom)
Verbeke and Viaene, 1999	Survey; Interview	157 and 303	Descriptive Analysis	To investigate consumers attitudes to and associations with quality labels for beef, and add insight to the potential role of quality labels in meat marketing. (Belgium)

Glitsch, 2000	Survey; Telephone	500 x 6 Countries	Descriptive Analysis, Factor Analysis	To obtain comparable information about consumer behaviour toward meant and perceptions of fresh meat quality. (Europe)
McEachern and Schroder, 2004	Interviews Survey; Mail	1000	Factor Analysis	To develop a strategic insight into how coordinators of value-based labelling schemes might integrate the voice of the consumer within the fresh-meat value chain. (Scotland)
Erikson et al., 1998	Survey; Mail	1217, 1232, and 1149	Logistical Regression, Descriptive Analysis	To determine the importance of beef cut attributes compared among three countries. (United States, Japan, Australia)
Rimal and Fletcher, 2003	Survey; Telephone	750	Probit Model	To address consumer attitude toward meat labelling and the influence of different aspects of meat labels on beef, poultry and seafood. (United States)
Tonsor et al., 2007	Interviews Survey; Online	1002, 1009, 1001, and 993	Random Parameters Logit Poisson	To evaluate the extent to which preferences are heterogeneous with and across country of residence defined groups and examine the distributional nature of these preferences. (United States, Canada, Japan, Mexico)

5.5 Consumer Survey

A number of empirical studies have used survey techniques to analyze consumer attitudes, perceptions, and willingness-to-pay for different product attributes, labelling, and assurance schemes. For example, Hanagriff et al. (2009) use an online survey of 502 participants in order to identify which decision variables are most influential when U.S. consumers purchase branded beef products. Table 5.2 provides an overview of a number of these studies that relate specifically to consumer markets for meat. This chapter uses data from a survey designed and administered by Umberger and Mueller (2009) in June of 2009. The survey included 2743 respondents (or participants) throughout Australia. The survey was composed of 5 sections. Respondents were screened out if they were less than 18 years of age, working in the beef industry, or in market research. As well, participants were screened out if they do not tend to purchase meat regularly, do not purchase beef at least on a monthly basis, or do not do the meat shopping for the household at least monthly.

The second section was designed to obtain information on meat purchasing and cooking behaviours. Section three collected information on brand and claim awareness. Research interest in this section is in regard to perceptions and purchasing habits of quality labels, specifically the MSA certification. The fourth section, discrete choice experiment, is not the focus of this investigation. The final section collects further socio-demographic information common to behavioural studies, and thus pertinent to this study. Table 5.3 provides an overview of the survey. The full survey can be found in Appendix 8.2.

Table 5.3 Survey Overview, Consumers

	# of Questions	Description of Research
Section 1: Screeners	4	This section identified respondents who may have may be subject to certain influences (e.g. employed by the beef industry) that alter their perception.
Section 2: Meat Purchase and Cooking Behaviour	13	Shopping behaviours, Attitudes, perceptions, satisfaction Knowledge level marbling and awareness
Section 3: Brand and Claim Awareness	11	Awareness of beef brands, purchase behaviour of beef brands Awareness of beef certifications, purchase behaviour of beef certifications Relative importance and of beef attributes
Section 4: Discrete Choice Experiment	16	Relative value of attributes - Measured through discrete choice experiments
Section 5: Socio- demographics	8	Socio-demographic information on the household

Source: Author`s summary of survey conducted by Umberger and Mueller, 2009.

Descriptive statistics in table 5.4 present the demographics of the sample group. Sixty six percent of the sample population are female, with the remaining 34% being male. This sample is skewed toward a higher percentage of females when compared to data collected by the Australian Bureau of Statistics (2003), which reports a split of 50% female and 50% male. Sixty nine percent of the respondents live in a metropolitan area. This is consistent with the Australian census data which reports that 66% of Australian`s are located in major cities (Australian Bureau of Statistics, 2003). Fifty nine percent of the respondents have

completed education beyond year 12. Respondents also varied in annual total household income and in age.

Descriptive statistics on shopping and cooking behaviours are presented in table 5.5. In regard to shopping habits, 69% of respondents used supermarkets as their main source for beef purchases and 30% percent claimed to use an independent butcher or meat shop as their main source. Very few participants chose farmer's market (two percent), direct from producer/farmer (two percent), or internet or direct mail order (less than one percent) as their main sources. Less than 1% of the sample claimed to, on average, purchase beef daily. Sixty percent purchased weekly, 30% percent every two weeks, and eight percent monthly. Respondents that purchased less than once a month were screened out of the analysis.

Descriptive statistics on awareness and purchasing of the various certifications are presented in table 5.6. Meat Standards Australia had the second highest level of awareness among participants with 25% of participants claiming to have seen or are aware of the certification. The highest level of awareness (94%) was for the National Heart Foundation Approved (NHFA) certification. In comparison, Lusk et al. (1999) find that one in four American respondents did not know what USDA grade they purchased, and attribute this failure to recognize grades on several factors including a potential difficulty in understanding the current USDA grading system. Such grades are intended to communicate to the consumer the level of tenderness in order to assist with their purchase decisions. 15% of respondents claimed to have previously purchased a product with the MSA

certification. Meat Standards Australia ranks second in regard to number of respondents claiming to have purchased a product with the respective beef certification. National Heart Foundation Approved certification had the highest number of respondents claiming to have previously purchased (86%) a product with this certification.

Figure 5.1 Overview of Socio-demographic Characteristics



Table 5.4 Descriptive Statistics of Socio-demographic Factors

Question	Variable	Mean	Std Dev	Minimum	Maximum
D1	Single	0.164	0.371	0	1
	Divorced / Separated	0.106	0.308	0	1
	Married / living with partner	0.700	0.458	0	1
	Widowed	0.030	0.170	0	1
D2	# People	2.861	1.295	1	8
D4	# Children	0.661	0.994	0	6
D5	Working full time	0.418	0.493	0	1
	Working part time	0.197	0.398	0	1
	A full time student	0.032	0.176	0	1
	A part time student	0.002	0.046	0	1
	Both working and studying	0.016	0.125	0	1
	Retired	0.135	0.342	0	1
	Engaged in full time home duties	0.105	0.306	0	1
	Not in paid work but looking	0.038	0.192	0	1
	On a pension	0.057	0.233	0	1
D6	Primary school or some primary school	0.011	0.105	0	1
	Some secondary school	0.216	0.412	0	1
	Finished year 12	0.180	0.384	0	1
	Diploma from CAE/TAFE	0.263	0.440	0	1
	Graduate degree from University or TAFE	0.233	0.423	0	1
Postgraduate degree	0.096	0.295	0	1	
D7	Below \$20,000	0.086	0.280	0	1
	\$20,001 - \$40,000	0.172	0.377	0	1
	\$40,001 - \$60,000	0.171	0.377	0	1
	\$60,001 - \$80,000	0.171	0.377	0	1
	\$80,001 - \$100,000	0.166	0.372	0	1
	\$100,001 - \$120,000	0.109	0.312	0	1
	\$120,001 - \$150,000	0.060	0.237	0	1
	\$150,001 - \$200,000	0.043	0.202	0	1
Over \$200,000	0.023	0.151	0	1	
A1	Male	0.342	0.474	0	1
	Female	0.658	0.474	0	1
A2	18 - 24 years	0.067	0.250	0	1
	25 - 34 years	0.195	0.396	0	1
	35 - 44 years	0.193	0.395	0	1
	45 - 49 years	0.141	0.348	0	1
	50 - 54 years	0.141	0.349	0	1
	55 - 64 years	0.180	0.384	0	1
	65 plus years	0.083	0.276	0	1
A3	Urban	0.690	0.463	0	1
	Rural	0.310	0.463	0	1

Source: Author's own analysis based on data from Umberger and Mueller (2009).

Table 5.5 Descriptive Statistics of Shopping and Cooking Behaviour

Question	Variable	Mean	Std Dev	Minimum	Maximum
A8	Supermarket - Main	0.692	0.462	0	1
	Supermarket - Some	0.283	0.450	0	1
	Supermarket - Never	0.026	0.158	0	1
	Butcher - Main	0.306	0.461	0	1
	Butcher - Some	0.595	0.491	0	1
	Butcher - Never	0.098	0.298	0	1
	Farmer's Market	0.016	0.127	0	1
	Farmer's Market - Some	0.189	0.392	0	1
	Farmers' Market - Never	0.794	0.404	0	1
	Producer - Main	0.015	0.123	0	1
	Producer - Some	0.082	0.274	0	1
	Producer - Never	0.903	0.296	0	1
	Direct Mail - Main	0.003	0.056	0	1
	Direct Mail - Some	0.030	0.170	0	1
	Direct Mail - Never	0.967	0.179	0	1
A4	1 Meal	0.002	0.046	0	1
	1 - 2 Meal	0.016	0.127	0	1
	3 - 4 Meal	0.077	0.267	0	1
	4 - 5 Meal	0.270	0.444	0	1
	6 - 7 Meal	0.634	0.482	0	1
A5	1 Beef	0.045	0.207	0	1
	1 - 2 Beef	0.447	0.497	0	1
	3 - 4 Beef	0.435	0.496	0	1
	4 - 5 Beef	0.058	0.235	0	1
	6 - 7 Beef	0.014	0.119	0	1
A6	1 Beef out	0.706	0.456	0	1
	1 - 2 Beef out	0.263	0.440	0	1
	3 - 4 Beef out	0.020	0.141	0	1
	4 - 5 Beef out	0.007	0.086	0	1
	6 - 7 Beef out	0.002	0.046	0	1
	More than 7 beef out	0.002	0.040	0	1
S3	Daily	0.013	0.112	0	1
	Weekly	0.604	0.489	0	1
	Fortnight	0.300	0.458	0	1
	Monthly	0.083	0.277	0	1
A13	COO	0.225	0.418	0	1
	SOO	0.195	0.396	0	1
	NOTAWARE	0.643	0.479	0	1

Source: Author's own analysis based on data from Umberger and Mueller (2009).

Table 5.6 Descriptive Statistics of Consumer Awareness and Purchasing Behaviours

Question	Variable	Mean	Std.Dev.	Minimum	Maximum
B5 Awareness	EQA	0.029	0.169	0	1
	NHFA	0.944	0.230	0	1
	MSA	0.248	0.432	0	1
	Aus-Qual	0.036	0.185	0	1
	Aus Beef	0.116	0.320	0	1
	None	0.049	0.216	0	1
B6 Purchased	EQA	0.016	0.125	0	1
	NHFA	0.856	0.351	0	1
	MSA	0.150	0.358	0	1
	Aus-Qual	0.021	0.143	0	1
	Aus Beef	0.071	0.257	0	1
	None	0.133	0.340	0	1

Source: Author's own analysis based on data from Umberger and Mueller (2009).

5.6 Consumer Attitudes Toward Beef

In order for value chain members to make informed decisions it is imperative to understand current perceptions and beliefs of the Australian meat consumer. Table 5.7 presents a look at how the sample population views the current state of beef and of the beef available. The majority of consumers are satisfied with the safety of the beef available, with only 7% of the total sample population demonstrating concern with the level of safety of the beef available. Although, 26% of the sample population appear to be concerned that beef production is harming the environment. In general, there appears to be no alarming issues with consumer dissatisfaction in any of the categories asked. A number of the attributes in table 5.7 have an impact on the MSA grade, but the

most direct outcomes of MSA are quality and consistency, along with simplifying the consumer shopping experience.

One of MLA's key roles is to grow consumer demand for beef products in the Australian market (Palmer, 2009). Meat Standards Australia was developed in order to address two key problems - a reduced level of cut and cooking knowledge among consumers, and a high degree of variability among beef available to consumers (Griffith et al., 2009; Griffith et al., 2010; Rodgers et al., 2007; Yann et al., 1993). The descriptive statistics presented allow for analysis of hypothesis one; It is hypothesized that after experiencing MSA labelled beef, consumers will have a higher confidence in their ability to select the appropriate product, and have a decreased concern about the variability among beef available. In this survey respondents were asked how strongly they agree or disagree with the following statement:

"The quality of beef available is too inconsistent."

Responses from this survey appear to be fairly mixed: 19% of respondents chose somewhat agree, seven percent agree, and three percent strongly agree. With 29% of respondents claiming to be dissatisfied, this research supports MSA's claim that the current status of beef has high variability. In addition, these findings further support the need for developing a grading system to reduce the inconsistency in beef quality. The statistics on the left hand in each column of table 5.7 provide the same statistics, but only includes consumers who have

previously purchased a beef product certified with the MSA label. It was hypothesized that consumers who have previously purchased a beef product containing the MSA label would have reduced concerns about the quality of beef available being too inconsistent. This was not the case. There appears to be only a slight reduction in concern between the total sample population when compared to those who have previously purchased a product containing the MSA label. This suggests that the creation of MSA and the subsequent labelling information available to consumers has not yet had a material effect on changing overall consumer perceptions about the consistency of beef quality available.

The second claimed major benefit of MSA beef at the retail level is that it simplifies the consumer purchasing experience, and therefore reduces the need for consumers to have a high level of cut and cooking knowledge. In this survey respondents were asked how strongly they agree or disagree with the following statement:

“I have a good understanding of the most appropriate cut of beef to use for different recipes / cooking methods.”

Respondents were confident in their ability to identify the most appropriate cut of beef, with one percent choosing strongly disagree, four percent disagree, and nine percent somewhat agree (total of 14%). On the other side nine percent chose strongly agree, 28% agree, and 31% somewhat agree, with a total of 68% demonstrating confidence in their understanding of the most appropriate cut of

beef to use for different recipes / cooking methods. It was hypothesized that consumers having previously purchased MSA labelled beef would become more confident in their choice of product selection. The percentage of respondents, looking at only those who have previously purchased MSA labelled product, increased to 82% (a 14% increase from 68% when observing the total sample population). This suggests that the simplicity that MSA intended to design into the purchasing experience has led to an increase in consumers' confidence in their ability to select the most appropriate product. It is important to note that there must be some caution with such a strict interpretation of the results. Such interpretation overlooks the possibility that a number of latent factors that lead consumers to purchase is also correlated with confidence in consumers' ability to select the appropriate piece of meat.

Table 5.7 Consumer Perceptions of Beef

Those who have Previously Purchased	Total Population		Strongly Disagree		Disagree		Somewhat Disagree		Neither Agree nor Disagree		Somewhat Agree		Agree		Strongly Agree	
I am satisfied with the safety of the beef available	0%	1%	2%	1%	4%	5%	22%	24%	29%	30%	34%	34%	8%	6%		
I trust the government to ensure that our beef is safe	5%	4%	8%	6%	12%	11%	20%	26%	27%	25%	21%	22%	7%	6%		
I am satisfied with the quality of beef available	0%	1%	2%	1%	8%	8%	14%	18%	38%	36%	30%	31%	8%	5%		
The quality of beef available is too inconsistent	5%	3%	14%	14%	18%	19%	29%	35%	23%	19%	8%	7%	3%	3%		
I am concerned that beef production is harming the environment (ie: by increasing greenhouse gases)	10%	8%	17%	15%	17%	16%	33%	35%	14%	16%	6%	7%	4%	3%		
Beef is produced in a manner that is environmentally sustainable	0%	1%	6%	5%	11%	11%	36%	45%	25%	20%	17%	15%	6%	3%		
The welfare of beef animals produced for human consumption is as good as can be expected	1%	2%	5%	5%	14%	12%	32%	37%	25%	23%	18%	18%	6%	3%		
Eating beef is risky to my health	22%	19%	32%	33%	20%	20%	17%	20%	5%	6%	3%	2%	1%	1%		
I am concerned about the use of hormones in beef production	3%	3%	8%	7%	8%	9%	20%	26%	25%	25%	20%	18%	14%	12%		
I am concerned about the use of antibiotics in beef production	2%	2%	6%	7%	9%	9%	22%	30%	26%	24%	20%	17%	15%	11%		
It is important to me to buy beef that has been produced locally/regionally	1%	1%	3%	3%	4%	5%	21%	27%	21%	26%	29%	25%	19%	13%		
I have a good understanding of the most appropriate cut of beef to use for different recipes/cooking methods	0%	1%	1%	4%	7%	9%	10%	19%	34%	31%	31%	28%	17%	9%		

Source: Author's own analysis based on data from Umberger and Mueller (2009).

5.7 Is the MSA Label a Consumer Quality Signal

The intention of quality labels is to provide consumers cues about the quality standard and related information of a special food product (communicate certain attributes to the end user). Verbeke and Ward (2006) find consumer interest is higher for a readily interpretable indication of quality such as certified quality marks of guarantee, in comparison to interest in cues directly related to traceability or product identification. The intention of this section is to identify perceptions consumers have regarding the attributes of a product containing the MSA certification label, when compared to other certification labels.

Third party services for private, voluntary, labelling can help overcome the credibility perceptions of a private system, thereby facilitating market transactions and increasing market efficiency (Golan et al., 2000; Caswell, 1998). The primary services that third party entities can provide to help strengthen the credibility of a labelling claim are standard setting, testing, certification, and enforcement (Golan et al., 2000). Given MSA is an example of a private and voluntary scheme in the meat sector, where compliant users of the grading system are allowed to carry their label, it can be hypothesized that the MSA label is a credible signal for beef quality and tenderness. This study analyzes whether or not consumers perceive the MSA label as being a credible signal for quality and tenderness, among other attributes.

Figure 5.8 presents consumers' attitudes toward each beef certification represented in this survey. In the survey respondents were asked to select whether or not the following statement applies to each of the five beef certifications:

“are more trustworthy”

When asked to select whether or not certain statements apply to the MSA certification label, 287 of 1881 (15%) respondents selected “are more trustworthy”. The MSA certification received the second highest rating for this statement, with NHFA having 42% of respondents believing it to be more trustworthy. Of the 467 respondents that were aware of the MSA certification, 156 (33%) believed the MSA certification to be more trustworthy.

The next question this research addresses is whether or not the MSA certification is perceived to be a signal for quality and tenderness. In the survey respondents were asked to select whether or not the following statement applies to each of the five beef certifications:

“are guaranteed to be better quality”

For MSA, 22% of respondents selected “are guaranteed to be better quality”. This is the second highest rating, with NHFA having 32% of respondents believing it to be guaranteed to be better quality. Rating below NHFA could be simply because there was a greater awareness (94%) of NHFA in comparison to the awareness of MSA (25%). Forty five percent of those that have

seen or are aware of MSA believed that products with the MSA certification are guaranteed to be better quality, compared to only 34% of those aware of the NHFA believing it to be guaranteed to be better quality.

Table 5.8 Consumer Perceptions of Beef Certifications

Question	Variable	EQA	NHFA	MSA	Aus-Qual	Aus Beef
B7	Are a better value for money	6%	24%	10%	5%	9%
	Are guaranteed to be better quality	17%	32%	22%	15%	15%
	Are more trustworthy	11%	42%	15%	12%	13%
	Are a healthier choice	6%	72%	9%	7%	8%
	Allow me to do something good (e.g. support producers or communities)	15%	23%	15%	9%	24%
	Are less risky	10%	40%	13%	12%	11%
	Are worth a premium	11%	30%	15%	10%	12%
	Are more tender	9%	20%	27%	6%	9%
	Are a safer choice	10%	48%	15%	12%	13%
	Are less risky	9%	40%	13%	11%	11%
	Are no different – the claim is a marketing gimmick	11%	20%	10%	10%	11%
	None apply	59%	13%	51%	62%	55%

Source: Author's own analysis based on data from Umberger and Mueller (2009).

Most labels suggest specific quality standards, but the question remains unanswered if consumers perceive and understand a labels particular message intended (Meixner et al., 2007). As noted previously, MSA was created in order to directly address the declining demand in beef consumption that is primarily the result of consumer perception of declining beef quality in terms of tenderness and palatability. In the survey respondents were asked to select whether or not the following statement applies to each of the five beef certifications:

“are more tender”

In regard to tenderness, MSA scored the highest of all certifications in this study with 27% of respondents believing products with this beef certification “are more tender”.

In all other categories (see table 5.8 for list of categories and descriptive results), NHFA scored the highest. With only 25% of respondents are aware of the MSA certification, 15% of respondents believe beef products containing the MSA certification are “more trustworthy”, 22% believe that products with the MSA certification “are guaranteed to be better quality”, and 27% believe these products to be “more tender”. Therefore, the MSA certification is perceived as a signal for quality. Since consumers appear to trust the MSA certification, as awareness increases it will most likely have the ability to increase the market share of value chains producing MSA labelled product, increasing their overall profits, helping to transform the Australian beef industry.

5.8 Relevance of Certification at the Consumer Level

There are at least two ways that beef chains can signal quality to the consumer; through private branding or through third party certification and labelling. Discussions with experts (see chapter four) on the Australian beef industry commonly raised the debate on whether or not grading systems are more effective when used as a consumer marketing tool (e.g. quality label), or simply as a system to underpin private brands. The topic of whether or not independent labelling is a necessary condition for signalling quality to the consumer is not without debate (Eden et al., 2008; Golan et al., 2000; Roosen et al., 2003). For example, Roosen et al. (2003) suggest that in the typical analysis of credence goods, quality signalling must be done through labelling by the government or by independent third parties. This suggests that private brands cannot properly signal quality to the consumer due to a lack of trust. This naturally leads to a comparison of the perceptions of the private brands and the beef certifications available through the survey used for this study.

Findings of a low awareness, combined with the high number of slaughters being graded would suggest that a grading system can be successful without the need to position the system as a certified label at the consumer level. It is estimated that 40% of all carcasses destined for slaughter in the domestic market are currently graded by MSA (Polkinghorne et al., 2008a). Another indicator of its acceptance is the fact that the number of carcasses graded has also been steadily increasing. Polkinghorne et al. (2008) suggest that the number of carcasses graded has risen to 786,000 in 2007, from just 252,000 in 1999-2000, and 626,000 in

2006. Further, Polkinghorne (2008) mentions MSA's prediction that some 2.25 million carcasses will be graded by 2010-2011. Despite such adoption, visibility at the retail level is generally low (Griffith et al., 2010). The results of this research find 467 out of 1881 (25%) survey participants claimed to have seen or are aware of the MSA grading system. This low level of awareness, relative to the number of carcasses being graded would suggest that a grading system can be successful, in terms of adoption and building a brand, without the need to position the system as a certified label at the consumer level.

As previously discussed, quality labels can have an impact on the whole value chain, and not just at the consumer level (Verbeke and Viaene, 1999). In the value chain survey discussed in chapter four, wholesale suppliers of beef discussed the lack of knowledge at the restaurant level on what products to order. This suggests that proper quality labels at every level have the ability to reduce information asymmetry. Table 5.9 suggests that a similar or greater number of participants in this survey find a number of private brands to be trustworthy.

Table 5.9 Consumer Perceptions of Private Brands

Question	Variable	Coles	Woolworths	Cert Angus	Coorong	1824	King Island	Terra Rossa	Diamond
B7	Good value for money	50%	54%	8%	5%	4%	8%	3%	3%
	Consistently good quality	25%	31%	28%	16%	14%	28%	14%	12%
	Trustworthy brand	31%	36%	29%	16%	13%	28%	14%	11%
	A healthier choice	17%	20%	23%	16%	12%	23%	13%	12%
	I'd be proud to buy and serve this brand as it allows me to support producers or communities	18%	22%	25%	21%	12%	25%	17%	14%
	A good product for everyday consumption	50%	58%	14%	9%	7%	13%	8%	7%
	A good product for special occasions or guests	15%	19%	31%	19%	16%	32%	18%	14%
	Less risky	21%	25%	22%	13%	10%	20%	11%	10%
	None of these apply	32%	26%	50%	62%	67%	52%	64%	68%

Source: Author's own analysis based on data from Umberger and Mueller (2009).

In addition, table 5.9 also demonstrates consumers attitudes toward each brand of beef presented in this survey. *Coles*, *Woolworths*, *Certified Angus Beef*, and *King Island* all have a similar, or greater, number of participants who perceive them as being of consistent good quality to those products carrying the MSA label. For many consumers that repeatedly shop at major retail chains the store brands will be the most familiar choice, and thus most used signal for quality. In such a case these companies may benefit from the added assurance (e.g. in terms of tenderness) that an MSA label could provide. Currently the MSA system is being used predominantly to support private brand initiatives or to underpin existing channel partner offers (Griffith et al., 2010). Elicitations with the value chains described in an earlier chapter revealed that in most instances when companies that used the MSA grading system, but not the label, the reason was that they wanted to build their brand – e.g. increase consumer perception of tenderness and quality of their brand, leading to increased market share. In the value chain survey conducted in an earlier chapter, a number of the companies interviewed claimed to have used MSA grading system to build their brand, did so without the use of labelling at the consumer end. In fact the percentage of total revenue graded and marketed with the MSA claim for each of the five companies was, 45, 60, 10, 90, and 0 (in order of largest to smallest company in the study). This practice is also mentioned by Griffith et al. (2010) who note that large retailers such as *Coles* and *Woolworths* often substitute their own private brands in place of MSA labelled products. This further supports the fact that third party labelling is not a necessary condition for signalling quality.

5.9 Model of Consumer Awareness

Heterogeneity of consumers implies that information is likely to be effective only when it addresses specific information needs and is strategically positioned for its target audience (Verbeke, 2005; Killinger et al., 2004). In order to address hypothesis three, which consumers are reacting to the quality cues currently being provided by the market, a logistical regression model is used. Whether or not the respondent is aware of the MSA grading system is first modelled against participants' socio-demographic characteristics. These factors (or variables) include marital status (*mar*), number of children (*child*), employment status (*empl*), highest level of education achieved (*educ*), total household income (*inc*), gender (*gend*), age (*age*), and location of residence (*resid*). The below model of consumer awareness outlines the empirical specification of the binary logit model:

Consumer Awareness of MSA - Demographics

$$\text{Aware} = \alpha_{10} + \beta_{11} \text{mar} + \beta_{12} \text{child} + \beta_{13} \text{empl} + \beta_{14} \text{educ} + \beta_{15} \text{inc} + \beta_{16} \text{gend} + \beta_{17} \text{age} + \beta_{18} \text{resid}$$

In an attempt to improve the model a number of variables were re-coded. Employment status was consolidated into working and not working participants. Education was grouped into achieving year 12 or less and into post year 12 education levels achieved. Income was grouped into a level of less than \$40,000 household earnings and greater than \$40,000 household earning. In each case, the changes did not eliminate significance to any of the variables. When dealing with dummy variables it becomes necessary to drop

one variable in each category, which becomes the reference group. Not doing so would cause exact collinearity.

In order to control for the impact of differences in eating and shopping behaviours a number of such variables were added to the model. Additions to the model include frequency of beef purchases (*purch*), number of main meals prepared in the household each week (*meal*), number of times beef products are prepared and eaten in the household's main meal at home (*prep*), frequency of beef products eaten outside of the home (*bout*), location where beef purchases occur (*locp*), awareness of the origin of beef purchases (*orig*), and knowledge level of marbling (*marb*). The second model (Consumer Awareness of MSA – Behaviours) below includes these eating and shopping behaviours along with the socio-demographic variables. Results of this model are presented in table 5.10 below.

Consumer Awareness of MSA - Behaviours

$$\begin{aligned} \text{Aware} = & \alpha_{20} + \beta_{21} \text{ mar} + \beta_{22} \text{ child} + \beta_{23} \text{ empl} + \beta_{24} \text{ educ} + \beta_{25} \text{ inc} + \beta_{26} \\ & \text{gend} + \beta_{27} \text{ age} + \beta_{28} \text{ resid} + \beta_{29} \text{ purch} + \beta_{210} \text{ meal} + \beta_{211} \text{ prep} + \beta_{212} \\ & \text{bout} + \beta_{213} \text{ locp} + \beta_{214} \text{ orig} + \beta_{215} \text{ marb} \end{aligned}$$

Table 5.10 Consumer Awareness of MSA - Behaviours

Question Variable						
Number	Category	Variable	Coefficient	Standard Error	P[Z >z]	Elasticity
		Constant	-0.1695	0.1338	0.2053	
D1	mar	Sin	-0.0703	0.0530	0.1851	-0.0503
		Divsep	-0.0958 **	0.0458	0.0366	-0.0442
		Marr	-0.0744	0.0605	0.2186	-0.2270
D2	child	Child	-0.0076	0.0117	0.5181	-0.0218
D5	emp	Work	0.0124	0.0239	0.6047	0.0340
D6	educ	Post12	-0.0056	0.0214	0.7947	-0.0144
D7	inc	Over40	-0.0114	0.0269	0.6720	-0.0369
A1	gend	Female	0.0408 *	0.0210	0.0526	0.1170
A2	age	25to34	0.0137	0.0512	0.7897	0.0116
		35to44	0.0425	0.0549	0.4392	0.0357
		45to49	0.1321 **	0.0639	0.0386	0.0811
		50to54	0.1365 **	0.0652	0.0363	0.0841
		55to64	0.0815	0.0599	0.1735	0.0638
		65Plus	0.0895	0.0719	0.2130	0.0324
A3	resid	Urban	0.0227	0.0211	0.2817	0.0681
A8	locp	Supmain	-0.0594 *	0.0326	0.0689	-0.1790
		Supnev	-0.0579	0.0504	0.2510	-0.0064
		Butmain	0.0054	0.0305	0.8605	0.0071
		Butnev	-0.0973 ***	0.0306	0.0015	-0.0417
		Mktmain	-0.0589	0.0655	0.3689	-0.0042
		Mktnev	-0.0586 **	0.0288	0.0417	-0.2029
		Prodmain	0.2175 *	0.1123	0.0528	0.0146
		Prodnev	0.0187	0.0375	0.6186	0.0735
		Mailmain	-0.0929	0.1441	0.5189	-0.0013
Mailnev	0.0342	0.0554	0.5376	0.1439		
S3	purch	Daily	0.2153 *	0.1283	0.0934	0.0120
		Weekly	0.0148	0.0412	0.7194	0.0390
		Fortnight	0.0149	0.0435	0.7315	0.0195
A4	meal	1to4meal	-0.0363	0.0374	0.3318	-0.0151
		6to7meal	0.0010	0.0242	0.9680	0.0027
A5	prep	1beef	-0.0880 *	0.0449	0.0501	-0.0171
		1to2beef	-0.0245	0.0221	0.2680	-0.0477
		4to5beef	0.1110 **	0.0502	0.0269	0.0283
		6to7beef	-0.0619	0.0706	0.3807	-0.0039
A6	bout	1bout	0.0507	0.0761	0.5057	0.1559
		1to2bout	0.0732	0.0894	0.4133	0.0838
		more4bout	-0.0558	0.1041	0.5918	-0.0027
A13	orig	COO	0.0116	0.0301	0.6989	0.0114
A11	marb	Notaware	-0.1425 ***	0.0301	0.0000	-0.3995
Number of observations		1881	McFadden Pseudo R-squared		0.0682	
Log likelihood		-982.29	Chi squared		143.75	

A goodness of fit measure is a summary statistic indicating how accurate the model approximates the observed data. There is no single measure for the goodness of fit in binary choice models (Verbeek, 2004). However, McFadden's R-squared measure is among the most commonly used indicator for goodness of fit in binary models (Verbeek, 2004; Greene, 2003). It was therefore the primary indicator used for analyzing goodness of fit for the logistical regression models in this study. The model of Consumer Awareness of MSA – Behaviours has a McFadden R-squared value of 6.8%. The likelihood ratio test was conducted to determine whether the difference in log likelihood values (without restriction and with the null hypothesis imposed) is significantly different from zero (Verbeek, 2004). The log likelihood ratio statistic is 143.75 in this model. By conducting a log-likelihood ratio test, this model is significant at the one percent level. Although steps were taken to reduce endogeneity (e.g. not include certain variables), the author recognises that some endogeneity could still be present in both models. Endogeneity exists when explanatory variables are correlated with the equation's error term (Verbeek, 2004).

5.10 Model of Purchasing Behaviours

Given heterogeneity in consumer preferences it cannot be taken for granted that every member of the Australian consumer base will pay attention to, and react systematically to, the information cues that are intended for them (Morales et al., 2009). For this reason a thorough understanding of each consumer segments' purchasing behaviours of quality labels is imperative for value chain members, marketers, and policy makers. Understanding consumer awareness is critical for marketers, but is only one step. An understanding of

how to take an uninformed consumer from unaware to aware, and then into making a purchase decision is critical for success of any marketer. The purchase model below models how socio-demographic, eating, and shopping behaviours are important determinants of a purchase decision. More specifically, whether or not the respondent has previously purchased a beef product containing the MSA certification is modelled against socio-demographic, eating, and shopping behaviours. Results of the model Consumer Purchasing of MSA – Behaviours are presented in table 5.11. This model has a McFadden R-square value of 9.7%. The log likelihood ratio statistic is 154.16 in this model. By conducting a log-likelihood ratio test, this model is significant that the one percent level.

Consumer Purchasing of MSA - Behaviours

$$\begin{aligned}
 \text{PrevP} = & \alpha_{30} + \beta_{31} \text{ mar} + \beta_{32} \text{ child} + \beta_{33} \text{ empl} + \beta_{34} \text{ educ} + \beta_{35} \text{ inc} + \beta_{36} \\
 & \text{gend} + \beta_{37} \text{ age} + \beta_{38} \text{ resid} + \beta_{39} \text{ purch} + \beta_{310} \text{ meal} + \beta_{311} \text{ prep} + \beta_{312} \\
 & \text{bout} + \beta_{313} \text{ locp} + \beta_{314} \text{ orig} + \beta_{315} \text{ marb}
 \end{aligned}$$

Table 5.11 Consumer Purchasing of MSA - Behaviours

Question Variable						
Number	Category	Variable	Coefficient	Standard Error	P[Z >z]	Elasticity
		Constant	-0.1508	0.0999	0.1314	
D1	mar	Sin	-0.0496	0.0361	0.1693	-0.0665
		Divsep	-0.0638 **	0.0298	0.0322	-0.0550
		Marr	-0.0567	0.0485	0.2431	-0.3237
D2	child	Child	-0.0064	0.0088	0.4674	-0.0345
D5	emp	Work	0.0223	0.0175	0.2034	0.1145
D6	educ	Post12	0.0186	0.0156	0.2347	0.0898
D7	inc	Over40	0.0055	0.0199	0.7817	0.0334
A1	gend	Female	0.0073	0.0157	0.6443	0.0390
A2	age	25to34	0.0071	0.0407	0.8625	0.0112
		35to44	0.0573	0.0494	0.2460	0.0902
		45to49	0.1316 **	0.0635	0.0383	0.1513
		50to54	0.1207 *	0.0631	0.0557	0.1393
		55to64	0.0958 *	0.0571	0.0935	0.1405
		65Plus	0.0620	0.0642	0.3340	0.0420
A3	resid	Urban	-0.0068	0.0160	0.6707	-0.0384
A8	locp	Supmain	-0.0219	0.0238	0.3572	-0.1235
		Supnev	-0.0403	0.0330	0.2219	-0.0084
		Butmain	-0.0008	0.0221	0.9702	-0.0021
		Butnev	-0.0678 ***	0.0213	0.0014	-0.0544
		Mktmain	-0.0577	0.0368	0.1170	-0.0078
		Mktnev	-0.0439 **	0.0218	0.0441	-0.2845
		Prodmain	0.0262	0.0651	0.6877	0.0033
		Prodnev	-0.0200	0.0299	0.5034	-0.1476
		Mailmain	-0.0249	0.1117	0.8234	-0.0006
Mailnev	0.0145	0.0380	0.7021	0.1146		
S3	purch	Daily	0.2015	0.1267	0.1118	0.0210
		Weekly	0.0030	0.0323	0.9270	0.0146
		Fortnight	0.0262	0.0358	0.4649	0.0640
A4	meal	1to4meal	-0.0035	0.0290	0.9029	-0.0028
		6to7meal	-0.0166	0.0185	0.3704	-0.0858
A5	prep	1beef	-0.0884 ***	0.0212	0.0000	-0.0322
		1to2beef	-0.0375 **	0.0162	0.0205	-0.1368
		4to5beef	0.0355	0.0358	0.3216	0.0170
		6to7beef	-0.0437	0.0445	0.3259	-0.0051
A6	bout	1bout	0.0642	0.0520	0.2170	0.3696
		1to2bout	0.0911	0.0814	0.2632	0.1953
		more4bout	0.0091	0.0962	0.9243	0.0008
A13	orig	COO	-0.0039	0.0196	0.8410	-0.0072
A11	marb	Notaware	-0.1394 ***	0.0245	0.0000	-0.7318
Number of observations			1881	McFadden Pseudo R-squared		0.0968
Log likelihood			-719.50	Chi squared		154.17

5.11 Model Results and Discussion

This section discusses the results of both logistical regression models (Consumer Awareness of MSA – Behaviours, and Consumer Purchasing of MSA - Behaviours) aimed at explaining how socio-demographic factors, and eating and shopping behaviours explain awareness and purchasing tendencies for beef products containing the MSA certification. A very similar story emerges for both the awareness and purchase models: the categories of age, income (significant in the purchase model only), gender (significant in the awareness model only), marital status, location of beef purchase, frequency of beef purchase, frequency of beef preparation and consumption in the home, and awareness of place of origin all have a number of variables that are statistically significant. The variables that are statistically significant in explaining awareness and prior purchase are outlined below. In addition, a number of other variables that are commonly cited in the literature are noted, and outlined why they were not significant in explaining the dependent variables. The coefficients of logistical regression models have very little direct meaning, but are used to calculate the probabilities associated with awareness and prior purchases of MSA labelled products (Martinez et al., 2007). For this reason the below analysis focuses on marginal effects.

Age

For the awareness model, the age categories between 45 years of age and 54, were all statistically significant (45 to 49 year; 13% more likely, with five percent significance, 50 to 54 years; 14%, with five percent significance) with positive coefficients, when compared to the base category of under 25

years of age. For previously having purchased, the age categories between 45 years of age and 64 years of age were statistically significant (45 to 49 year; 13% more likely, with 5% significance, 50 to 54 years; 12%, with 10% significance, 55 to 64 years; 10%, with 10% significance) with positive coefficients. These findings are consistent with what was hypothesized and with what others have found. For example, Verbeke and Ward (2006) find that ages 30 to 50 years place a higher importance and attention to the label in general, as well as to a quality guarantee, compared to other groups. Lusk et al. (1999) also find the marginal probability for age to be positive and significant when estimating the likelihood to indicate a preference for a tender steak. From this it is apparent that older consumers are more likely to be aware of and to have previously purchased beef products containing the MSA certification. In order to increase awareness of the MSA certification in the Australian market, advertisements targeted at age groups outside of this specific range may have the largest impact. For example, without losing focus on the 45 to 64 year old current consumer base, advertisements could be directed at younger shoppers.

Source of beef

Question A8 of the survey asked respondents to select their main source for beef purchases. Prior studies have found that place of purchase plays an important role as a quality indicator (Glitsch, 2000). In this study, 69% of respondents used supermarkets as their main source for beef purchases and 30% percent claimed to use an independent butchers or meat shop as their main source. Very few participants chose farmer's market (two percent), direct from producer/farmer (two percent), or internet or direct mail order (less than one

percent) as their main sources. For the awareness model, respondents who purchased directly from producer/farmer as the main source were 22% more likely (10% significance) to be aware of the MSA label. Respondents whose main source for beef purchases was at the supermarket were six percent (five percent significance) less likely to be aware of the MSA label. The respondents who claimed to never purchase beef from the butcher (10% less likely at the one percent level) were less likely to be aware of the MSA label.

A similar story emerged when analyzing the characteristics that influence a consumer's decision to purchase. In this model, those who never purchase beef in the butcher shop or the farmers market were less likely to have previously purchased a beef product with the MSA label (seven percent less likely at the one percent level, and five percent less likely at the five percent level). The results from this section are consistent with what was hypothesized, given supermarkets' resistance to apply the MSA label. Those consumers that tend to purchase beef from the more specialized venues such as the farmers market are more likely to be aware of the MSA grading system. Respondents who never purchased from the more specialized venues such as the butcher or farmers market, or that used the supermarket as their main source, are less likely to be aware.

These results are also consistent with the earlier discussion on supermarkets' hesitation to label products with the MSA certification label. In order to develop a broader awareness and increase purchases of MSA labelled beef products, adoption of the label by supermarkets would have powerful implications.

Frequency of purchase

Question S3 in the attached survey asks how often the respondent purchases beef. Using monthly as the base category, the daily purchase of beef variable is statistically significant and positive in the awareness model (22% more likely with 10% significance). This suggests that those who purchase beef on a daily basis have a higher propensity to be aware of the MSA label. This result is also intuitively consistent with what one would expect.

Beef as main meal

Question A5 in the survey asks how often beef products are prepared and eaten in the respondents' main meal at home. Consistent with what one would expect it was found that frequently eating beef in the respondents' main meal at home had a significant effect on both awareness of the MSA label and on having previously purchased a beef product with the MSA label. Using 3 to 4 times per week as the base category, respondents who eat beef 4 to 5 times per week were 11% more likely to be aware of the MSA label (five percent significance). Those that eat beef less frequently were also more likely to not be aware or to have previously purchased. To clarify, those that prepared and ate beef products in their main meal at home less frequently were less likely to have purchased a product with the MSA label.

Knowledge of marbling

Question A11 in the survey asks the respondent to choose the statement that best describes the definition of marbling. Of the four choices, one is do not know, one is a correct answer, and two response choices are incorrect definitions of marbling. Respondents that did not choose the correct answer are 14% less likely (one percent significance) to be aware of the MSA label and 14% less likely (one percent significance) to have previously purchased a beef product with the MSA label. This result is also consistent with what would be expected. Those who are less knowledgeable about beef characteristics are less likely to be aware of the MSA label.

Other variables to note

Gender was not statistically significant in the purchase model, and had a very small impact (female four percent more likely to be aware, with 10% significance) in the awareness model. This is consistent with the findings of Verbeke and Ward (2006), who note that the importance of the label in general does not differ significantly between genders. Lusk et al. (1999) also find gender to be insignificant when analysing the probabilities of factors affecting consumers' preference for guaranteed tender steaks in the U.S.

This study did not find that education, or number of children in the household had a statistical significance. This is also consistent with the findings of Verbeke and Ward (2006) who note that education and the presence of children had little significant impact on the likelihood for expressing interest in a quality guarantee for beef in Europe.

In our models income was not statistically significant. In contrast to what others have found (e.g. Wachenheim et al., 2000), this is consistent with Martinez et al. (2007), who find that income does not significantly affect the purchase of branded beef. This is what was expected since MSA beef is not simply about a higher quality product, but more importantly a more consistent and predictable product. Rimal and Fletcher (2003) note that employment status, level of education achieved, number of children in the household, and household income to be insignificant when looking at consumer attitudes toward meat labels.

5.12 Conclusions

Declining per capita beef consumption has been identified as major concern not only in Australia, but in other parts of the world, including North America. Many have argued that the declining in beef consumption can be explained in part by the decline in beef quality relative to other meats. In order for the industry to increase its competitiveness it must respond to such demands of modern consumers. Furthermore, fresh meat is particularly vulnerable to information asymmetries, and as a result beef value chains have turned to both private and public labelling schemes in an attempt to communicate to consumers important quality attributes about beef, such as quality and tenderness. But in order to be effective in overcoming such asymmetries, labels and the certifying entities behind them must be perceived as being credible by the users.

One of Meat and Livestock Australia's key roles is to grow consumer demand for beef products in the Australian market (Palmer, 2009). Meat

Standards Australia was developed by Meat and Livestock Australia in order to address two key problems - a reduced level of cut and cooking knowledge among consumers, and a high degree of variability among beef available to consumers (Griffith et al., 2009; Griffith et al., 2010; Rodgers et al., 2007; Yann et al., 1993). It was hypothesized that consumers who have previously purchased a beef product containing the MSA label would have reduced concerns about the quality of beef available being too inconsistent. This was not the case. There appears to be only a slight reduction in concern between the total sample population when compared to those who have previously purchased a product containing the MSA label, suggesting that creation of MSA and the subsequent labelling information available to consumers has not yet had a material effect on changing overall consumer perceptions about the consistency of beef quality available. The second claimed major benefit of MSA beef at the retail level is that it simplifies the consumer purchasing experience, and reduces the need for consumers to have a high level of cut and cooking knowledge. It was hypothesized that consumers having previously purchased MSA labelled beef would become more confident in their choice of product selection. The percentage of respondents, looking at only those who have previously purchased MSA labelled product, increased to 82%, an increase from 68% when observing the total sample population. This suggests that the simplicity that MSA intended to design into the purchasing experience has led to an increase in consumers' confidence in their ability to select the most appropriate product.

This research finds that 33% of the respondents that were aware of the MSA certification perceive the MSA label to be a trustworthy certification.

The MSA label ranked the second highest when asked in this category. In addition, the MSA label ranked the highest when consumers were asked which beef certifications are more tender and second highest when asked which certifications are guaranteed to be better quality. This chapter thus concludes that the MSA certification is perceived as a signal for tenderness and quality. This chapter argues that this has largely been achieved by MSA through signalling quality through providing a consistently consistent product to the end consumer.

There is still a gap in the literature on marketing strategies for MSA and other certification labels. Even though MSA is perceived as a trustworthy certification and a signal for quality and tenderness, heterogeneity of consumers implies that not all consumers absorb and use information in the same way. For these reasons, this paper looks at how perceptions and purchasing behaviours differ between the numerous socio-demographic characteristics within our sample. Binary Logistical regression models find that older, female (awareness only), shoppers who purchase beef more frequently are more likely to be both aware of and to have previously purchased beef products with the MSA certification. Respondents who never purchased from the more specialized venues such as the butcher or the farmers market, or that used the supermarket as their main source, are less likely to be aware. Such findings will assist value chains, marketers, and policy makers. As with any analysis of labelling, a significant problem with evaluating their effectiveness is that programs are often complementary to, or coincidental with, other forces influencing markets for quality (Caswell and Mojduszka, 1996).

This paper then addressed a further gap; whether or not it is necessary to develop a grading system as a certification in the consumer market (e.g. quality label) in order to be effective, or is managing an effective control system that is scientifically proven to have a higher correlation to eating quality than other grading systems, along the whole value chain sufficient for success. Low levels of awareness compared to the number of carcasses graded, as well as a number of companies in the value chain survey having success without an end user MSA label, suggest that grading systems can be effective and successful without communicating such third party certification at the consumer level. That is, consumers appear to be convinced by the intrinsic eating quality after they had purchased, without having been aware at the point of retail purchase that the product had been produced under compliance with the MSA system. But findings of the MSA label rating the highest when consumers were asked which beef certifications are more tender and second highest when asked which certifications are guaranteed to be better quality, suggests that this awareness has created a demand pull, no doubt affecting the value chain adoption of the grading system. Therefore, it is concluded that a trustworthy (credible) third party label is helpful, but by no means a necessary condition for a successful grading system.

Research results provided throughout this chapter will also provide the foundation for studies in other parts of the world, such as the North American beef industry, currently struggling with similar trends of decreased consumer satisfaction.

6. Discussions and Conclusions

6.1 Discussions and Conclusions

Declining per capita beef consumption has been identified as major concern not only in Australia, but in other parts of the world including North America. Many have argued that the declining in beef consumption can be explained in part by the decline in beef quality relative to other meats. To satisfy increasing demands for various beef attributes (search, experience, credence), and to hedge against systemic risks, the implementation of chain-wide quality management systems are regarded as possibly the most sustainable strategy. It is increasingly recognized that individual producers are no longer able to ensure the increasing range of meat quality attribute dimensions on their own. A well-designed and executed grading system can not only provide advantages to consumers and reduce declining meat consumption trends, but also potentially benefit all members along the value chain. Particularly, the implementation of consumer oriented grading system can have important effects on individual companies and the industry as a whole.

This thesis was designed in three distinct parts. Chapter two developed a review of the literature on supply chains, providing a platform of the fundamental economic literature this thesis is based upon. Chapter four aims to contribute to a better understanding of the effects of closer value chain coordination and integration on the success of beef value chain systems. The case of the Meat Standards Australia (MSA) system is used as a benchmark and “best in class approach”. Earlier work by Nelson (1970), Porter (1985),

and Williamson (1985) provide the foundation on which Ketchen et al. (2008) develop the concept of best value supply chain. Based on the work by Ketchen et al. (2008), the focus of this research is on chains that have developed farm-to-retail brand-driven value chains in the Australian beef market. The empirical analysis is based on a cross-section of in-depth interviews with processors and retailers in value chains of differential degrees of vertical coordination.

The analysis has focused on the issues of organizational design of the value chains, the concept of best value supply chains, collaboration, and information sharing and trust. Using Ketchen and Hult's (2007) best value supply chain concept as a benchmark my research supports prior claims that the implementation of the MSA grading system increases product consistency and quality. This factor has helped companies not only differentiate their brands, but has also acted as a catalyst for two of the five companies to form. But it comes at a cost of slowing down the supply process. Four of the five companies did not believe that "high costs of meeting ongoing MSA grading requirements" was an important obstacle for slowing down or causing problems for their value chain expansion, and the majority of companies did not consider the costs of implementation as excess.

With regard to the extent and role of collaboration, I find that the implementation of the MSA grading system does not appear to have an effect on moving toward more integrated decision making. But with companies paying based on value, it can be said that the implementation of MSA is providing a platform for moving toward a more integrated approach. The analysis presented in this paper provides evidence of how the increased

information provided as a result of implementing the MSA grading system can have a positive effect on value chain coordination. The majority of companies indicated that the cost required to provide further information to other members of the value chain is greater than the benefit from information they receive from other value chain members. Therefore, in contrast to what I had expected from the literature on transaction costs, agency theory and best-value-supply-chains in the context of beef, my findings suggest that the MSA grading system has had a mixed effect on value chain performance. In particular, the findings suggest that MSA had a mixed effect on firms in moving toward best value supply chain positioning as well as increased coordination and information sharing.

This research may benefit the Australian livestock and meat industry by helping to identify barriers to further information sharing and adoption of MSA. Both adopters and non-adopters of MSA may gain benefits for growing their value chains. However, in interpreting the above results, it is important to keep the case-study nature of this study in mind, and in particular the limited sample size underlying the above results.

Chapter five then moves to the other end of the value chain, analyzing consumer attitudes and behaviours toward beef labels. In addition, it attempts to address the effectiveness of the MSA label in the consumer market. One of Meat and Livestock Australia's key roles is to grow consumer demand for beef products in the Australian market (Palmer, 2009). Meat Standards Australia was developed by Meat and Livestock Australia in order to address two key problems - a reduced level of cut and cooking knowledge among consumers, and a high degree of variability among beef available to consumers (Griffith et

al., 2009; Griffith et al., 2010; Rodgers et al., 2007; Yann et al., 1993). It was hypothesized that consumers who have previously purchased a beef product containing the MSA label would have reduced concerns about the quality of beef available being too inconsistent. This was not the case. There appears to be only a slight reduction in concern between the total sample population when compared to those who have previously purchased a product containing the MSA label, suggesting that creation of MSA and the subsequent labelling information available to consumers has not yet had a material effect on changing overall consumer perceptions about the consistency of beef quality available. The second claimed major benefit of MSA beef at the retail level is that it simplifies the consumer purchasing experience, and reduces the need for consumers to have a high level of cut and cooking knowledge. It was hypothesized that consumers having previously purchased MSA labelled beef would become more confident in their choice of product selection. The percentage of respondents, looking at only those who have previously purchased MSA labelled product, increased to 82%, an increase from 68% when observing the total sample population. This suggests that the simplicity that MSA intended to design into the purchasing experience has led to an increase in consumers' confidence in their ability to select the most appropriate product.

This research finds that 33% of the respondents that were aware of the MSA certification perceive the MSA label to be a trustworthy certification. The MSA label ranked the second highest when asked in this category. In addition, the MSA label ranked the highest when consumers were asked which beef certifications are more tender and second highest when asked which

certifications are guaranteed to be better quality. This paper thus concludes that the MSA certification is perceived as a signal for tenderness and quality. I would argue that this has largely been achieved by MSA through signalling quality through providing a consistently consistent product to the end consumer.

Even though MSA is perceived as a trustworthy certification and a signal for quality and tenderness, heterogeneity of consumers implies that not all consumers absorb and use information in the same way. For these reasons, this paper looks at how perceptions and purchasing behaviours differ between the numerous socio-demographic characteristics within our sample. Binary Logistical regression models find that older, female (awareness only) shoppers who purchase beef more frequently are more likely to be both aware of and to have previously purchased beef products with the MSA certification. Such findings will help marketers to understand the effectiveness of current marketing schemes, the characteristics of current purchasers, as well as markets for potential expansion of MSA purchasers. Respondents who never purchased from the more specialized venues such as the butcher or the farmers market, or that used the supermarket as their main source, are less likely to be aware. Such findings will assist value chains, marketers, and policy makers. As with any analysis of labelling, a significant problem with evaluating their effectiveness is that programs are often complementary to or coincidental with other forces influencing markets for quality (Caswell and Mojduszka, 1996).

This paper then addressed a further gap; whether or not it is necessary to develop a grading system as a certification in the consumer market (e.g. quality label) in order to be effective, or is managing an effective control

system that is scientifically proven to have a higher correlation to eating quality than other grading systems, along the whole value chain sufficient for success. Low levels of awareness compared to the number of carcasses graded, as well as a number of companies in the value chain survey having success without an end user MSA label, suggest that grading systems can be effective and successful without communicating such third party certification at the consumer level. That is, consumers appear to be convinced by the intrinsic eating quality after they had purchased, without having been aware at the point of retail purchase that the product had been produced under compliance with the MSA system. But findings of the MSA label ranking the highest when consumers were asked which beef certifications are more tender and second highest when asked which certifications are guaranteed to be better quality, suggests that this awareness has created a demand pull, no doubt affecting the value chain adoption of the grading system. Therefore, it is concluded that a trustworthy (credible) third party label is helpful, but by no means a necessary condition for a successful grading system. These findings support prior claims (chapter 4 presents a number of companies that claim the implementation of MSA helped build their brand and Griffith, 2010) that the adoption of a credible certifying scheme, such as MSA, can help a value chain build its brand. Griffith et al. (2010) present two retail supply chains that have developed vertically integrated value chains based on the MSA system in order to provide a consistent product to the end consumer.

6.2 Implications in a Canadian Context

It became readily apparent that the overall objective of this thesis was not to simply look at specific implications of one grading system on one market. Meat Standards Australia was used as an example of a best in class tool, which was hypothesized, for a number of reasons outlined in chapter four, to enhance value chain coordination, among other things. With this in mind, although this research was conducted using Meat Standards Australia, Australian value chains, and Australian consumers, some lessons can be extracted and implied in contexts outside of Australia; In a Canadian context, for example.

Declining per capita beef consumption is not unique to the Australian beef industry, and has been witnessed in other parts of the world including North America (Ferrier and Lamb, 2006; Purcell, 1989; Schroeder et al., 1998). The Australian and Canadian meat and livestock beef industries share many commonalities. Given the relative size of exports both industries are major players in the international arena. Success by both countries is contingent on demonstrating to their international players that their respective products are safer and of higher quality than other international exporting countries. In order to do this, importing countries must, for example, perceive their traceability and quality grading systems to be both effective and reliable. In Canada, “...*closer coordination through supply chain alliances is developing alongside the traditional commodity production system as a means to present consumers with differentiated, value-added products*” (Brocklebank and Hobbs, 2004). Branded beef programs are emerging as a response to consumer

demands for differentiated products, but to date only on a relatively limited scale (Brocklebank and Hobbs, 2004).

As with the adoption of any concept (supply chain integration, traceability, producing desired attributes, grading systems, etc) the parties that will benefit from altering their behaviour (e.g. adoption) need to be informed and educated on the benefits. This education has been claimed to be theoretically easier to do in Australia than in other countries for two primary reasons: larger farm sizes and heavy export orientation. Larger farm sizes leads to fewer producers to convince of the benefits. Given a larger volume of beef production is exported, Australian producers are also more likely to understand the importance of trade, and thus the adoption of methods such as traceability and advanced grading systems that help facilitate trade. Cow-calf operations in Canada tend to be 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 (Brocklebank and Hobbs, 2004). In additions, Steiner et al. (2007) find that cow-calf producers in Canada to be unlikely to participate in a beef alliance. Another barrier for individual producers for forming trusting alliances and building brands is due to the high concentration of the feedlot and processing sector. In Canada the three largest processors account for about 90% of the total Canadian slaughter capacity, where as the top 25 processors in Australia account for approximately 77% of Australia's red mead production (John, 2007; Fletcher et al., 2009).

The Canadian beef industry also has some inherent advantages over other beef industries. First of all, Canada's climate is better suited for producing barley which has been shown to enhance beef tenderness (Sitz et al.,

2005). In addition, the current beef herd in Canada is made up entirely of *Bos taurus* animals, with little to no *Bos indicus*. This provides a tenderness advantage to Canada over herds found in Australia and the U.S. which contain a mix of *Bos indicus*, *Bos taurus* and *Bos indicus* – *Bos taurus* cross (Bindon and Jones, 2001; Sitz et al, 2005; Australian Government, 2010; Wheeler et al., 1994; Canadian Beef Export Federation, 2010).

Given the fact of inherent tenderness advantages (e.g. breed, climate) in the Canadian beef industry, combined with the fact that the Canadian beef industry faces a number of hurdles for adoption of new technologies, is such a grading system feasible, or even necessary for the Canadian beef industry? Taking into account Canada's current challenges in the international market (country-of-origin labelling, BSE, etc), combined with the added benefits to the beef industry, adoption of a similar system would clearly be beneficial. Although the Canadian beef industry faces the previously mentioned hurdles of integration and producer adoption, a grading system that is scientifically proven to have a higher correlation to eating quality than other grading system, this thesis is clear in pointing out the benefits of a consumer oriented approach to the beef industry.

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Chapter Eight: Appendix

8.1 Value Chain Survey

Expert Elicitation

A Thesis Project on Value Chains and their use of Meat Standards Australia

The overall goal of this study and corresponding elicitation is to gain an in depth understanding of the Meat Standards Australia (MSA) system, and to ascertain the specific benefits it has had on the livestock and meat industry in Australia.

You have been identified as a key stakeholder, and we highly appreciate your time and feedback. Your answers to this survey should represent your personal and professional views as they relate to your role in the industry.

Please answer each question as accurately as possible. The results of this project are contingent on the accuracy of your answers.

If you do not feel comfortable answering a particular question, or would like the results of a particular question to be kept confidential, please notify the recorder.

We assure you that we will treat your responses with the utmost confidentiality. Future scientific publications that may arise from this study will never reveal your identity or the identity of your firm.

Contact: Gregory N Bott
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NOTE: FOR ALL MSA AND VALUE CHAIN QUESTIONS PLEASE ANSWER IN RELATION TO YOUR BEEF OPERATIONS ONLY.

Section 1: Business Size and Scope:

1. How many employees were employed by your company in 2009?

	Full Time	Part Time
Number of Employees		

2. Please estimate (as best you can) the percentage of time your employees were involved in the following activities during 2009. Number should sum to 100% for each column.

Activity	Full Time (%)	Part Time (%)
General Management		
Beef Production		
Lot Feeding		
Packing and Processing		
Wholesaling		
Retailing		
Food Service		
Research and Development		
Other (Please Specify)		

3. Please estimate (as best you can) the percentage of your firm's total revenue in 2009 that came from your most important customer or client (in terms of revenue):

% of revenue from most important customer/client	%
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4. Using the table below, please briefly identify all other firms (buyers and sellers) that are currently members of your value chain and how big they are relative to your own firm, in terms of full-time employees. Consider your own size = 100%. You can summarize many small companies on one line as long as it is clear what you are doing.

Example: If you buy livestock from Joe's Feeders who is a lot feeder and is only ¼ of the size of your firm.

Company Name	Input Provider or Buyer	Relationship	Relative size
Example: Joe's Feeders	Input provider	Lot feeder we purchase beef cattle from	25%

5. Please estimate (as best you can) the percentage of your plant's total revenue that came from the sale of meat products to clients in the following geographical markets in the last 12 months (If you do not currently sell into this market please indicate with a "0"):

Geographical Market Location	% of Total Revenue
Within local state	
Within Australia, but outside of your state/territory	
United States (Export)	
Japan (Export)	
Korea (Export)	
Other (please indicate)_____	
Other (please indicate)_____	

6. Please estimate (as best you can) the percentage of your plant's total revenue in the last 12 months that came from the sale of meat products which are differentiated and marketed with one of the following attributes/claims (If you do not currently sell into this market please indicate with a "0"):

Attribute	% of Total Revenue
MSA (graded and marketed with grade)	
Branded	
Grain-fed (marketed with claim)	
Grass-fed (marketed with claim)	
No Hormones or Antibiotics (marketed with claim)	
Certified Organic	
Other (please indicate) _____	
Other (please indicate) _____	

Section 2: Value Chain Success and Hindrance Factors:

7. When considering the success of your business's beef value chain development during the last three years (2007 to 2009), how important were each of the following factors? (For each row/factor, please tick the level of importance with an "X" or ✓).

Contributing Success Factor	Level of Importance				
	Very Important	Important	Moderately Important	Of Little Importance	Not at all important
Ability to meet <u>existing domestic</u> clients' needs/demands efficiently and effectively	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ability to meet <u>existing export</u> clients' needs/demands efficiently and effectively	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Market growth /expansion of existing markets (e.g. increase in market share)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Development of <u>new domestic</u> market/clients	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Development of <u>new export</u> market/clients	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Implementation and use of new information or communication systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Implementation of new technology in value chain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (Please Explain)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (Please Explain)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. When considering the success of your business's value chain development during the last three years (2007 to 2009), how important were each of the following institutional sources for your business? (For each row/factor, please tick the level of importance with an "X" or ✓).

Institutional Success Factor	Level of Importance				
	Very Important	Important	Moderately Important	Of Little Importance	Not at all important
Meat and Livestock Australia (MLA)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Meat Standards Australia (MSA)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
State/territorial government institutions (e.g. Food Centres, Dept. of Primary Industries, Research Development Institutes)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Federal Research Institutions (e.g. CSIRO, Cooperative Research Centres, CRCs)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TAFE, Technical Institutes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Universities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (Please Explain)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (Please Explain)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9. During the last three years (2007 to 2009), how important were the following problems and obstacles for slowing down or causing problems for your value chain expansion (High means it had a large negative effect, slowed down and/or caused problems. For each row/factor, please tick the level of importance with an “X” or ✓)?

Impediment/ Problem	Level of Importance				
	Very Important (Major Problem)	Important (Problematic)	Moderately Important	Of Little Importance	Not at all important
Lack of financial resources/funds within firm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of financial resources from outside of firm (e.g. value chain partners lacking financial resources)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Loss of key market	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Costs of meeting market requirements too high	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of qualified management personnel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of qualified labour	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of affordable labour	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Difficulty finding reliable chain partners	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Difficulty finding trustworthy chain partner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Regulatory constraints or requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
High innovation costs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
High costs of implementing MSA	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
High costs of meeting on going MSA grading requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (Please Explain)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (Please Explain)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (Please Explain)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section 3: Meat Standards Australia Perceptions and Adoption:

10. What percent of your total beef production (output) is MSA graded?

% of total production that is MSA graded	%
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11. Why do you only grade this percent? Please explain below.

--

12. What percent of your product is MARKETED (labeled) with an MSA grade?

% of total production marketed with MSA grade	%
--	----------

13. Please indicate below the percentage of each product grouping that is graded MSA and which are typically labeled MSA when marketed: (If all your grain feed in domestic market is graded MSA write 100%) Write n/a if a particular category is not sold by your company.

Attribute	Domestic		Export	
	% Graded MSA	% Labeled MSA	% Graded MSA	% Labeled MSA
Branded	%	%	%	%
Grain-fed (marketed with claim)	%	%	%	%
Grass-fed (marketed with claim)	%	%	%	%
No Hormones or Antibiotics (marketed with claim)	%	%	%	%
Certified Organic	%	%	%	%
Other (Please Indicate)	%	%	%	%
_____	%	%	%	%
_____	%	%	%	%

14. If you export, have you realized any benefits of the MSA grading system in the export market? Please ✓ Yes or No below:

Yes (Please explain the benefits below) No

Please explain benefits below:

--

15. What were the key factors that lead your firm to implement the MSA grading system?

Factor	Degree of Importance				
	Very Important	Important	Moderately Important	Of Little Importance	Not at all important
Expected Increased Premiums/Higher Price	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Expected Increased (or maintenance of) Market Share	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Expected Reduced Market Risk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Expected Reduced Price Variability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Expected Reduced Cost	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Expected Increased Chain Collaboration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

16. In your opinion, what are the main benefits to your business of utilizing the MSA grading system? Please rate the impact of each of the following benefits of MSA to your business. For example, if you saw a large increase in the price of your product-implementation of MSA then check high degree of impact for “increased premiums/higher price”. If your prices did not change or were actually lower then tick “no change”, or “worse off”, respectively.

Benefit	Degree of Impact				
	High	Medium	Low	No Change	Worse off
Increased Premiums/Higher Price	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Increased (or maintenance of) Market Share	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reduced Market Risk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Expected Reduced Price Variability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reduced Cost	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Increased Chain Collaboration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section 4: MSA Program Cost

17. What types of costs did you initially incur as a direct result of implementing the MSA system? Please provide estimates of the size of these costs. Total of these MSA costs should sum to 100%.

Types of costs	% of initial costs out of total (100%)
Investment in equipment	%
Investment in technology	%
Investment in training (certification, QA, etc)	%
Advertising and promotion	%
Research and development	%
Other (please specify)	%
Other (please specify)	%

18. What are the on-going costs you incur as a direct result of using the MSA system? Please provide estimates of the size of these costs. Total of these MSA costs should sum to 100%.

Types of costs	% of on-going costs out of total (100%)
Investment in equipment	%
Investment in technology	%
Investment in training (certification, QA, etc)	%
Advertising and promotion	%
Research and development	%
Other (please specify)	%
Other (please specify)	%

19. Are the financial costs (that relate specifically to MSA) directly shared with your business partners? Please ✓ Yes or No below:

- Yes (Please explain below how this works) No

If so, how is this cost sharing determined?

20. Are you considering increasing or decreasing the percentage of retail sales that your firm currently markets as MSA graded? Please ✓ Yes or No below:
 Yes (Please explain the benefits below) No

If so, which are you doing and why?

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21. Are you considering moving completely away from MSA? Please ✓ Yes or No below:
 Yes (Please explain why below) No

If so, why?

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22. It is estimated that 40% of all carcasses destined for slaughter in the domestic market are currently graded by MSA (Polkinghorne et al., 2008). What do you think are the primary driving forces behind **non-adoption** of MSA by the beef industry? Please indicate, using an “X” or a ✓, the importance of each of the following factors to non-adopting firms.

Factor	Level of Importance				
	Very Important (Major Problem)	Important (Problematic)	Moderately Important	Of Little Importance	Unimportant
Premiums/Price Incentive for MSA graded product are too low.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Costs of adopting MSA are too high	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Difficult to find chain partner /supplier who will also adopt MSA practices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Too little information provided to industry about benefits of MSA	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Industry is lacking information about how to implement MSA	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of reduced market risk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (Please Explain)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (Please Explain)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

23. In regard to industry adoption levels, what did MLA do well? Please consider the design, implementation, and current system.

24. In regard to industry adoption levels, what should MLA have done differently? Please consider the design, implementation and current system.

25. Considering the program as a whole, what changes would you like to see to the MSA system? Why?

26. “Through an ‘MSA Brand Support Program’ MLA provides funding and marketing assistance to [private beef brands] to help them launch and develop, to raise the eating quality experience for Australian consumers” (Senate Standing Committee). Have you received any of this support? (Please ✓ Yes or No below):

- Yes (Please explain below) No

If yes, please describe the support you have received (dollar figures not necessary). How has this support helped to develop your brand?

27. Since you have implemented the MSA system have you decreased your reliance on spot markets (e.g. sales yards)? Please ✓ Yes or No below:
 Yes (Please explain below) No

Please explain what you have done and why:

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Section 5: Value Chains:

Please indicate the extent that you agree with the following statements:

	Level of Agreement				
	Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree
28. During the first few months after I implemented the MSA grading system I considered the MSA standards that were required from me to be implemented as excessive.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. The initial investments that were needed to become part of an MSA driven value chain were rather large, considering that I did not have market evidence of consumer acceptance.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. The initial investments that were needed to become part of an MSA driven value chain were rather large, considering that I was not sure how I could re-use the investment elsewhere if our value chain broke down.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. One of the major factors for deciding to become part of an MSA driven value chain was the fact that I was concerned that others in the chain could exert market power in future negotiations over prices or quantities.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. One of the major factors for becoming part of an MSA driven value chain was the fact that this standard was developed and supported by Meat & Livestock Australia.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

33. What are the premiums (in % of revenue), at each organizational level, that you receive for MSA graded product, over that of non-MSA graded? Please check off only those that apply to YOUR business.

Activity	Premium
Beef Production	%
Lot Feeding	%
Packing and Processing	%
Wholesaling	%
Retailing	%
Food Service	%
Other (Please Specify)	%

34. Are the financial premiums (that relate specifically to MSA) directly shared with your business partners? Please ✓ Yes or No below:
 Yes (Please explain below) No

If yes, how is this internal price determined? Please explain.

35. Consider your business before and after implementing the MSA grading system. Do you think utilizing the MSA grading system has added value to your supply chain? Please ✓ Yes or No below:
 Yes (Please explain below) No

If yes, please explain how MSA has added value to your firm?

36. Consider the extent that the implementation of the MSA grading system impacted internal processes within your business and the external interfaces between you and your business partners. Please indicate to what extent you would agree with the following as it relates to the implementation of MSA on your business.

	Level of Agreement				
	Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree
Reorganized our business structure for the better	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Our staff are now better trained	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has improved internal logistics costs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has improved internal logistics speed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improved customer relationships	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Increased communication with chain members	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improved responsiveness to changes in customers' needs (flexibility)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify)					
Other (please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

37. What, if any, are other benefits (“spin offs”) that you believe have resulted from closer cooperation within the value chain as a result of MSA?

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38. Has coordination with chain partners intensified as a result of implementing the MSA grading system? Tick “yes”, “no” or “not applicable” for each chain partner in the table below:

Chain Partner(s)	Yes	No	Not Applicable
Beef Production	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lot Feeding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Packing and Processing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wholesaling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Retailing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Food Service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (Please Specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

39. What do you think are the main benefits of the MSA system for the other members of your value chain?

Benefit	Degree of Impact				Worse off
	High	Medium	Low	No Change	
Increased Premiums/Higher Price	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Increased (or maintain) Market Share	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reduced Market Risk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reduced Cost	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Increased Chain Collaboration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

40. Are your profits directly tied to the performance of any other member(s) of the chain or to the performance or profits of the chain as a whole? Please ✓ Yes or No below:

- Yes (Please explain below) No

And are the profits of any of the other member(s) directly tied to your performance or profits? Please ✓ Yes or No below:

- Yes (Please explain below) No

Please briefly explain.

Section 6: Information

41. What type of information (beyond the information required to comply with MSA) is transmitted between you and your business partners? And what is the frequency of this transmission?

42. What decisions are mutually discussed and made between more than one member of the value chain (with your business partners)? Please provide details of which decisions, and of which players are involved in the decision.

43. For the decisions that are now mutual decisions, were they made independently prior to joining using the MSA grading system?

44. I would benefit from additional information that is currently withheld by other members of the chain (✓ Yes or No below):

- Yes (Please explain below) No

If yes, please describe the type of information that you would benefit from that is currently withheld by other members of the chain?

45. Please indicate the extent that you agree with the following statement:

	Level of Agreement				
	Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree
I benefit at least as much from the information I receive from the other chain members as the cost and time required of me to provide information to the other members of the chain.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Thank you for taking the time to complete this survey.

8.2 Consumer Survey

Meat survey

Wendy Umberger and Simone Mueller

Screener questions

S1. Do you work in any of the following industries?

- Automotive
- Media and Advertising
- Marketing
- Education
- Consulting
- Beef
- Construction
- Market Research
- Soft Drinks Manufacturer
- None of the above

S2. Which of the following types of groceries do you tend to buy regularly? (Check all that apply)

- Fruits
- Vegetables
- Meat
- Cereals/breads
- Dairy products

S3. On average, how often do you purchase each of the following products?

	Daily	Weekly	Fortnightly	Monthly	Less than once a Month	Never
Fish						
Beef						
Chicken						
Pork						
Lamb						

S4. How often do you do the meat shopping /purchasing for your household?

- Always
- Weekly
- Fortnightly
- Monthly
- Less than once a month
- Never

SECTION A:

Sociodemographics for quotas of survey

A1. What is your gender?

- Male
- Female

A2. How old are you?

- under 18 years
- 18-24 years
- 25-34 years
- 35-44 years
- 45-49 years
- 50-54 years
- 55-64 years
- 65+ years

A3. Where do you live?

- Sydney metro
- NSW other
- Melbourne Metro
- VIC other
- Brisbane Metro
- QLD other
- Perth Metro
- WA other
- Adelaide Metro
- SA Other
- Hobart Metro
- TAS other
- Canberra Metro
- ACT other
- NT

Meat purchase and cooking behaviour

A4. Considering an average week, approximately how many **main meals** are prepared in your household each week?

- Less than one per week
- 1 – 2 per week
- 3 – 4 per week
- 4 – 5 per week
- 6 – 7 per week

A5. Considering all main meals in an average week, how often are **beef** products prepared and **eaten in your main meal at home**?

- Less than 1 time per week
- 1 – 2 times per week
- 3 – 4 times per week
- 4 – 5 times per week
- 6 – 7 times per week

A6. Considering an average week, how often do you eat **beef** products **outside of home** (e.g. restaurant)?

- Less than 1 time per week
- 1 – 2 times per week
- 3 – 4 times per week
- 4 – 5 times per week
- 6 – 7 times per week
- More than 7 times per week

A7. How often do you prepare or consume each of the following **cuts of beef** throughout the year?

Cut of Beef	Daily	Weekly	Fortnightly	Monthly	Less than once per month	Never
Mince Beef	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Beef burger patties/ beef rissoles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Steak	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Roast	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Beef Sausages	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Diced Beef/Casserole cuts/Stir Fry Cuts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A8. **Where do you purchase** most of your beef?

*Tick **no more than 2** sources as your 'Main source' of Beef,*

Tick any sources that you 'Sometimes' use as a source of Beef, and all sources where you 'never' purchase beef.

Location	Beef Source		
	Main Source	Sometimes a Source	Never
Supermarket (e.g. Woolworths/Safeway, Coles, IGA/Foodland etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Independent Butcher or Meat Shop	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Farmer's Market	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Direct from Producer/Farmer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Internet or Direct Mail Order	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A9. Please indicate which statements and **benefits** you believe are characteristics of **supermarkets** (e.g. Coles, Woolworths/Safeway, IGA/Foodland) and which statements are characteristics of **independent butchers / meat shops**.

Tick all that apply for each type of beef retail outlet or mark "None of the above".

This shopping location provides...	Supermarket	Independent Meat Shop/ Butcher
Beef products that are better value for money	<input type="checkbox"/>	<input type="checkbox"/>
A convenient source of beef	<input type="checkbox"/>	<input type="checkbox"/>
High quality beef	<input type="checkbox"/>	<input type="checkbox"/>
Fresh supply of beef	<input type="checkbox"/>	<input type="checkbox"/>
Beef with consistent and predictable quality	<input type="checkbox"/>	<input type="checkbox"/>
A wide assortment of beef cuts and sizes	<input type="checkbox"/>	<input type="checkbox"/>
Tailor made to order beef products (e.g. specific beef cuts or products)	<input type="checkbox"/>	<input type="checkbox"/>
Trustworthy information about the production or processing methods used	<input type="checkbox"/>	<input type="checkbox"/>
A good source of advice about cooking methods	<input type="checkbox"/>	<input type="checkbox"/>
A high level of customer service	<input type="checkbox"/>	<input type="checkbox"/>
None of the above apply	<input type="checkbox"/>	<input type="checkbox"/>

A10. The following are a series of statements regarding your beliefs about various aspects of beef.
Please indicate how strongly you agree or disagree with each statement by ticking the appropriate box.

Statement	1 = Strongly Disagree	2 = Disagree	3 = Somewhat Disagree	4 = Neither Agree nor Disagree	5 = Somewhat Agree	6 = Agree	7 = Strongly Agree
I am satisfied with the <u>safety</u> of the beef available	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>	7 <input type="checkbox"/>
I trust the government to ensure that our beef is safe	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>	7 <input type="checkbox"/>
I am satisfied with the <u>quality</u> of beef available.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>	7 <input type="checkbox"/>
The quality of beef available is too inconsistent.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>	7 <input type="checkbox"/>
I am concerned that beef production is harming the environment (e.g. by increasing greenhouse gases).	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>	7 <input type="checkbox"/>
Beef is produced in a manner that is environmentally sustainable.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>	7 <input type="checkbox"/>
The welfare of beef animals produced for human consumption is as good as can be expected	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>	7 <input type="checkbox"/>
Eating beef is risky to my health	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>	7 <input type="checkbox"/>

I am concerned about the use of hormones in beef production	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>	7 <input type="checkbox"/>
I am concerned about the use of antibiotics in beef production	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>	7 <input type="checkbox"/>
It is important to me to buy beef that has been produced locally/regionally	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>	7 <input type="checkbox"/>
I have a good understanding of the most appropriate cut of beef to use for different recipes/cooking methods	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>	7 <input type="checkbox"/>

A11. Generally speaking **marbling** is used to evaluate beef.

Please tick the statement that you believe best describes marbling?

If you do not know please tick "Do Not Know":

Marbling can best be described as:

- Fat surrounding the outside of a steak
- Small flecks of fat in the lean tissue of a steak
- Small muscles surrounding the main muscle in a steak
- Do Not Know

A12. Marbling is the *intramuscular fat or the small flecks of fat in the lean tissue on the inside of the steak*. NOT the external fat (fat trim) around the outside of the steak.

Which of the following statements describes your perceptions of marbling and fat trim as it applies to steak. *Tick ALL that apply.*

- Marbling is NOT good, I try to purchase meat with as little marbling as possible.
- Marbling is good, it increases the quality (flavour, tenderness and/or juiciness) of my steak and I look for steaks with more marbling when purchasing steak.
- I do not really pay attention to marbling
- I want a steak with as little external fat (fat trim) as possible.
- I do not pay attention to the external fat (fat trim)

A13. What type of origin information do you usually know or have information about when purchasing beef products.









Please tick ALL of the origins which you are usually aware of when buying beef:

- Country of Origin where product was produced
- State-of-origin (VIC, SA, QLD, NSW, NT, TAS, ACT, WA) where product was produced
- Region-of-origin (e.g. Gippsland, Darling Downs, Margaret River, Barossa, Riverland) where product was produced
- Farm-of-origin where product was produced
- I am generally NOT aware of the origin.





Section B: Brand and Claim Awareness

B1. The following table contains brands of beef that might be sold either in your supermarket or at your local butcher / meat shop.

For each brand, please indicate yes if you **have seen or are aware** of this brand.

Brand	I am aware of this brand
	<input type="checkbox"/> Yes
	<input type="checkbox"/> Yes
	<input type="checkbox"/> Yes
	<input type="checkbox"/> Yes
	<input type="checkbox"/> Yes
	<input type="checkbox"/> Yes
	<input type="checkbox"/> Yes
	<input type="checkbox"/> Yes
	<input type="checkbox"/> None of them

B2. For each brand, please indicate if you have ever **previously purchased** this brand.

Brand	I have purchased this brand
	<input type="checkbox"/> Yes
	<input type="checkbox"/> Yes
	<input type="checkbox"/> Yes
	<input type="checkbox"/> Yes
	<input type="checkbox"/> Yes
	<input type="checkbox"/> Yes
	<input type="checkbox"/> Yes
	<input type="checkbox"/> Yes
	<input type="checkbox"/> None of them

B3. Please list the names of any **OTHER** brands of any beef products that you are aware of?
 If there are no others please put “none”

B4. The table below includes some statements that people have said about different brands of beef.

- For each brand (column), tick all statements that you believe apply to the specific brand shown below.
- If no statement is relevant for the brand then mark the bottom row stating “None of these apply”.
- It does not matter if you currently do not purchase or have not previously seen the brand – we are interested in your impressions of each of the brands.

								
Good value for money	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Consistently Good quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Trustworthy brand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A healthier choice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I'd be proud to buy and serve this brand as it allows me to support producers or communities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A good product for everyday consumption	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A good product for special occasions or guests	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Less risky	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
None of these apply	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

B5. The table below contains images of **beef certifications** that you may or may not have seen before on your beef products.

Check “yes” if you **have seen or are aware** for each of them. If you have seen the certification but have not purchased it you should still answer “yes”.

Please tick all that apply.

Beef certification	I am aware of this certification
	<input type="checkbox"/> Yes
	<input type="checkbox"/> Yes
	<input type="checkbox"/> Yes
	<input type="checkbox"/> Yes
	<input type="checkbox"/> yes
None of them	<input type="checkbox"/>

B6. Please check “yes” if you’ve previously **purchased** beef products with these beef certifications.
Please tick all that apply.

Beef certification	I have purchased a product with this certification
 <p data-bbox="475 633 767 685">EATING QUALITY ASSURED AUSTRALIAN BEEF</p>	<input type="checkbox"/> Yes
	<input type="checkbox"/> Yes
 <p data-bbox="576 1014 667 1039">TENDERNESS GUARANTEED</p>	<input type="checkbox"/> Yes
 <p data-bbox="571 1216 671 1232">ISO 9001 Quality Management System</p>	<input type="checkbox"/> Yes
	<input type="checkbox"/> yes
<p data-bbox="539 1435 703 1464">None of them</p>	<input type="checkbox"/>

B7. For each of the **beef certifications** shown in the top row of the table below, **tick all statements which you believe apply**.
 If no statement is relevant for a certification then mark the bottom row to indicate “None of the statements apply.”

Products with this Beef Certification ...					
Are a better value for money	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are guaranteed to be better quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are more trustworthy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are a healthier choice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Allow me to do something good (e.g. support producers or communities)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are less risky	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are worth a premium	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are more tender	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are a safer choice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are less risky	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are no different – the claim is a marketing gimmick	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
None apply	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

B8. The following are production or process related certifications that you may or may not have seen or heard of previously.

Please indicate (by ticking “yes” next to the claim) whether **you’ve seen or heard** of the certifications previously.

Certification	Yes, I am aware of this certification
Natural Beef	<input type="radio"/>
Grass-fed Beef	<input type="radio"/>
Hormone and Antibiotic Free	<input type="radio"/>
Grain-fed Beef	<input type="radio"/>
Environmentally Sustainable	<input type="radio"/>
Certified Humane	<input type="radio"/>
None of these	<input type="radio"/>

B9. Please indicate (by ticking “yes” next to the claim) whether **you have purchased** a beef product with any of the process or production certifications.

Certification	Yes, I have purchased a product with this certification
Natural Beef	<input type="radio"/>
Grass-fed Beef	<input type="radio"/>
Hormone and Antibiotic Free	<input type="radio"/>
Grain-fed Beef	<input type="radio"/>
Environmentally Sustainable	<input type="radio"/>
Certified Humane	<input type="radio"/>
None of these	<input type="radio"/>

B10. For each of the production or processing related certifications shown in the top row of the table below, **tick all statements which you believe apply.**

If no statement is relevant for a certification then mark the bottom row “None of the statements apply.”

	Natural Beef	Grass-fed Beef	Hormone & Antibiotic Free Beef	Grain-fed Beef	Environmentally Sustainable Beef	Certified Humane Beef
Better quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tender	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Naturally raised	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Raised on open pastures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
From animals only fed a grass diet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
From animals fed a grain diet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Better for my health	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Better for society	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Less food safety risks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Raised in a more environmentally friendly manner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Raised in a more sustainable manner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Raised in a manner that treats animals more humanely	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Raised without antibiotics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Raised without hormones	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Meaningless, just a marketing gimmick	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
None of the above apply	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

B11. Consider what traits you look for when you are purchasing a beef steak for **consumption at home** (e.g. evening meal with family or for yourself). Using the following table please:

- 1) In the first column please tick the 1 product trait/attribute which is **Most Important** to you when you are making a fresh beef purchase decision
- 2) In the second column, please tick all other attributes which you may also consider important when making a beef steak purchase decision. If none of the attributes apply then click “other” and please explain in the box provided in the bottom row.

Quality Trait/ Attribute	Most Important Characteristic (Tick 1 Only)	I ALSO Usually Consider (Tick all that apply)
Bright Red Colour	<input type="radio"/>	<input type="radio"/>
High percent lean (little fat within the meat)	<input type="radio"/>	<input type="radio"/>
Little external fat (little fat around outside of steak)	<input type="radio"/>	<input type="radio"/>
Highly Marbled (intramuscular fat within the steak)	<input type="radio"/>	<input type="radio"/>
Specific cut (e.g. steak vs. roast)	<input type="radio"/>	<input type="radio"/>
Nutritional Information (protein, vitamins & minerals)	<input type="radio"/>	<input type="radio"/>
Use by date /Expiration date	<input type="radio"/>	<input type="radio"/>
Price per kg	<input type="radio"/>	<input type="radio"/>
Budget/ Discounted price	<input type="radio"/>	<input type="radio"/>
Tenderness verification or guarantee	<input type="radio"/>	<input type="radio"/>
Aged for at least 14 days	<input type="radio"/>	<input type="radio"/>
Kosher or Halal methods	<input type="radio"/>	<input type="radio"/>
Branded – specific brand	<input type="radio"/>	<input type="radio"/>
Size of package (family pack)	<input type="radio"/>	<input type="radio"/>
Natural label	<input type="radio"/>	<input type="radio"/>
Certified organic	<input type="radio"/>	<input type="radio"/>
Breed (e.g. Angus)	<input type="radio"/>	<input type="radio"/>
Australian country-of-origin	<input type="radio"/>	<input type="radio"/>
Free Range	<input type="radio"/>	<input type="radio"/>
Locally Raised	<input type="radio"/>	<input type="radio"/>
Traceable from farm to consumer	<input type="radio"/>	<input type="radio"/>
Non-Genetically Modified (non-GMO) and Not fed GMO feed	<input type="radio"/>	<input type="radio"/>

PART D: Sociodemographics

D1. Which of the following best describes your **household make up**.

- Single
- Divorced or separated
- Married/ living with partner
- Widowed

D2. **How many people** are living in your household? _____

D3. How many of them are **children under 18 years**? _____

D4. Please indicate the **age categories of your children** living at home.

Tick all that apply.

- Less than 1 year old
- 12 to 24 months (1-2 years old)
- 3-4 years old
- 5-7 years old
- 8-11 years old
- 12-14 years old
- 15-17 years old

D5. Currently I am... (*choose the one option that best describes you...*)

- Working full time
- Working part time
- A full time student
- A part time student
- Both working and studying
- Retired
- Engaged in full time home duties
- Not in paid work but looking
- On a pension (other than age pension)

D6. Please indicate the category that best describes the **highest level of education** that you have achieved

- Primary school or some primary school
- Some Secondary School
- Finished Year 12
- Diploma from CAE/TAFE
- Graduate degree from University or TAFE
- Postgraduate degree (Grad. Dip., Masters, PhD)

D7. Which one of the following categories best describes your annual **total household income** (before tax)?

- Below \$20,000
- \$20,001 - \$40,000
- \$40,001 - \$60,000
- \$60,001 - \$80,000
- \$80,001 - \$100,000
- \$100,001 - \$120,000
- \$120,001 - \$150,000
- \$150,001 - \$200,000
- Over \$200,000

D8. What is your post code _____