Assessing Demand for Organic Lamb Using Choice Modelling

A thesis

submitted in partial fulfilment

of the requirements for the Degree of

Master of Commerce and Management

at

Lincoln University

by

M. P. Rutledge

Lincoln University

2009

Abstract

The worldwide market for organic foods is growing fast, but New Zealand meat producers have been slow to respond. Specifically, New Zealand producers have little or no organic lamb products for export or domestic sale. Part of the reason for this hesitancy to meet demand with supply is that the nature of the demand and consumer willingness to pay for the product is not well understood.

Purpose: The purpose of this study is to investigate New Zealand organic food consumers' attitudes towards organic food and production methods and to evaluate consumer willingness to pay for an organic lamb product.

Methodology: Data for this study was collected using computer aided personal interviewing (CAPI) in supermarkets and speciality stores in Christchurch and Wellington. The study questioned consumers about their consumption habits, attitudes towards organic food and production methods and presented choice modelling scenarios to test willingness to pay for different attributes of lamb. Factor analysis is used to group the 12 attitudinal questions into three factors which were then placed into a two step cluster analysis to create consumer segments. Choice modelling was then used to measure consumer preferences for the tested attributes of lamb.

Results: From the factor and cluster analysis three distinct consumer segments were found and labelled as Committed Organic Seekers, Convenience Organic Consumers and Incidental Organic Consumers. These labels reflect each group's organic consumption habits and attitudes towards organic food. The choice modelling results show that there is a willingness to pay for organic lamb. The three identified consumer groups state they would pay a premium of 61%, 44% and 26% respectively for organic lamb over standard pasture raised lamb.

Originality/Value: This paper gives an insight into consumer attitudes and preferences towards a product that could provide a way for New Zealand farmers to increase their returns. It contributes to the body of knowledge about the likely consumer profiles of regular consumers of organic food. There are only a few other studies that have attempted to measure

consumer attitudes and willingness to pay for organic meat, however, the author is not aware of any published example of a study that has specifically investigated demand for organic lamb anywhere in the world. The study provides information about stated willingness to pay for five different attributes of lamb; this information should be of value in assisting the industry by showing which product offerings are likely to generate the highest sale price.

Keywords: Organic, Lamb, Choice Modelling, Factor Analysis, Cluster Analysis, Consumer Attitudes, Willingness to Pay.

Table of Contents

List of Tables and Charts

Chapter One - Introduction

1.1   Why Study Organic Food?

Pockets of value and areas of growth emerge even in mature areas of the food industry as producers and retailers look towards new methods of operation or points of difference to increase their sales and market share. One area that has shown strong and stable growth over the last 15 years has been organic food, with a steady growth rate of around 20% per annum (Hughner, McDonagh, Prothero, Shultz II & Stanton, 2007). Such a rate of growth indicates that producers and retailers ought to have a well considered organic food strategy and makes the organic food sector worthy of investigation by academics. Of particular interest is the attempt to isolate the values and attitudes that lead to consumers desiring organic food. Such knowledge has significant implications for marketers, allowing them to create the right appeals to stimulate further growth in the organic food sector, and for producers so that they can supply the products the market demands.

1.2   Overview of the New Zealand Lamb Industry

The primary sector has always been a key driver of the New Zealand economy. At different times in the post WWII period many primary sector industries have experienced times of very strong performance and times of difficulty. During the period from 1950-1980 the sheep industry had a sustained period of excellent sales and profits. Since then, margins have become much tighter and the lamb meat industry (and the sheep industry in general) has been suffering sustained poor returns with the financial situation described by a farmer in Taylor (2008) as "being unacceptable and unsustainable and lamb prices as being a potentially devastating issue". National Soil Association chairman David Raine also described the returns to farmers as unsustainable (Farmers Guardian, 2007). By unsustainable it is meant that at current returns more and more farmers will be forced to move out of sheep production. The production and marketing companies in the New Zealand sheep meat industry are best categorised as a price takers. That is they sell largely undifferentiated products with New

Zealand suppliers often undercutting each other to win contracts from powerful overseas buyers (Long, 2006). These increasingly slim profit margins make the industry vulnerable to market fluctuations such as an increase in supply from overseas competitors or changes in the exchange rate. With the success of the dairy industry and the continued disappointment of the sheep industry performance many farmers are now converting land to dairy. This can be seen happening currently as latest statistics show the total number of sheep in NZ is at its lowest level since records began (www.stats.govt.nz). In order to ensure the success and future viability of the sheep industry the meat companies must find a way to differentiate their product to give them the ability to sell their offerings at a price that is resistant to market vagaries and provides acceptable returns to farmers.

1.3   Research Motivation and Benefits

Other primary production industries in New Zealand such as forestry, apples, viticulture and dairy have all experienced, or are currently experiencing, periods of excellent returns. One industry that once experienced high returns before slipping into a significant period of poor results is the New Zealand kiwifruit industry. However, over the last 10 years the industry has turned itself around to become very successful after the long period of poor returns.

There are many differences in the structure of the kiwifruit and sheep industries in New Zealand that may partly or wholly explain the difference in the performance of the two industries. The kiwifruit industry, headed by the marketing company ZESPRI operates as a single-desk seller of kiwifruit from New Zealand to the world market (except for Australia). ZESPRI have a strong, well recognised brand, a dedication to quality through their vine-to-consumer supply chain and have made significant investments into diversifying their product range with ZESPRI Gold kiwifruit and an organic product line. These factors allow ZESPRI to sell their products at significant premiums over their overseas competitors (C. Greenlees, personal communication, 28.11.07). While organic sales still make up a reasonably small part of total ZESPRI sales at around 4% the amount is growing and the organic fruit sells for a premium of around 15-20% (C. Greenlees, personal communication, 28.11.07) over standard fruit. In contrast with ZESPRI's strategy of actively pursuing the organic market, the lamb industry has virtually shunned organics. The big New Zealand lamb processing and marketing companies have only a very small organic offering. The researcher was

unsuccessful in obtaining figures for organic lamb production from publicly available sources. Organisations such as Organics New Zealand, Crop and Food, Ministry of Fisheries and Agriculture and Statistics New Zealand were also unable to provide these figures.

The success of the kiwifruit industry and particularly the importance placed on having an organic product line vis-à-vis the attitude of the New Zealand sheep industry towards organics was a key motivation to undertake this research. This difference in importance placed on organics is worthy of consideration given the difference in industry performance. This study will assess consumer demand for organic lamb to investigate whether the sheep industry is missing out on a potential growth market.

1.4   Key Objectives

The key objectives of this research are to investigate the attributes of lamb that New Zealand consumers consider important when making their lamb meat purchase decisions. Measuring consumer willingness to pay (WTP) for an organic lamb product is of particular importance to this research. The other main focus of this study is to examine consumers' attitudes towards organic food and production methods to enable comparison between New Zealand consumers' attitudes and those found in other studies to be held by European consumers, with the goal of creating a profile of regular consumers of organic food in New Zealand. This research will therefore attempt to answer the following three key questions:

1.   What attributes of lamb do consumers' value the most?
2.   Do consumers show a demand for an organic lamb product?
3.   How do New Zealand consumers compare to European consumers regarding their attitudes towards organic food and their demographic profiles?

1.5   Thesis Structure

Chapter one of this thesis has discussed the potential market gap for an organic lamb product. It has outlined difficulties in the structure and performance of the New Zealand lamb industry

and the need for increased returns to return profitability to farming sheep in New Zealand. The key objectives of the study have been stated and an outline given of what is to come.

Chapter two is the literature review section and is in two main parts. The first section looks at who consumers of organic food are, discusses attribute based consumer theory, reviews the key drivers for purchase of organic food and main barriers to organic food purchase, and finishes with a review of how organic consumers have been studied in the past. The second part of chapter two will look at the theories behind the main analysis techniques this study uses, namely choice modelling, factor analysis and cluster analysis.

Chapter three focuses on the research gap that exists and why this research is important to help fill it. The study's hypotheses are presented and discussed.

Chapter four explains the research methodology. This covers the overall research design, the important variables and how they are measured, the survey creation process, pilot testing and the changes made due to the pilot testing and finally discussed the actual data collection process.

Chapter five outlines the data analysis techniques used and results they generated. This chapter covers the sample descriptive statistics and results for the attitudinal questions. Following these basic descriptors of the data more advanced techniques are used to investigate if different consumer profiles can be found within the data set and to generate willingness to pay measures for the tested attributes. This involves the use of factor analysis, cluster analysis and choice modelling.

Chapter six is the discussion, implications and conclusions section. This involves delving into the results and explaining the impacts and meaning of these values. This covers the consumer profiles identified in chapter five and how these consumers are similar or different to the consumer profiles of European consumers as identified in chapter two. Following this the key research questions and hypotheses are addressed with respect to the results and the implications these results have for the New Zealand lamb industry. This section finishes with a discussion of the limitations of the study, the key contribution it has made to the body of knowledge and potential future research directions.

1.6 Chapter Summary

Chapter one has presented the basic rationale for why this research is necessary and could be of value to the New Zealand sheep meat industry. The growth in the market for organic food in some of the meat industry's key markets is outlined as well as reasons given for why the New Zealand sheep meat industry may be missing out on ways to increase returns, with organic production being one of these. The key research goals that drive this research are given along with the structure of the rest of this document.

Chapter Two – Literature Review

2.1   Overview

This chapter is presented in two main sections. The first section reviews work that has attempted to identify profiles of regular consumers of organic food, the attitudes that drive their consumption of organic food and the methods used to study these consumers. This research mostly looks at European consumers, which is particularly useful to this study as Europe is a key export market for New Zealand sheep meat. These studies show that there is only a very generic profile of who organic consumers are and there is much debate and disagreement about any attempts to classify these consumers further. This chapter then looks at the approaches that have been used in these studies and how they went about measuring consumer attitudes towards organic food. Following this, the findings of these studies regarding the key drivers for purchase and barriers towards the purchase of organic food are discussed.

The second section focuses on reviewing the literature around the key analysis techniques that will be used to look at the participants in this survey and at how to measure their willingness to pay for the attributes of the lamb product. Firstly the attribute based approach to looking at products is reviewed and discussed as an appropriate way to look at lamb purchase. The theory behind the key analysis techniques of choice modelling, factor analysis and cluster analysis is then discussed with reference to the statistical workings of these processes.

2.2   Consumers of Organic Food

The market for organic foods at current sales levels must still be considered a niche market although with current growth rates some organic products are becoming mainstream food items (Squires, Juric & Cornwell, 2001). While different areas of the world have adopted organic foods at different rates, even in the most receptive countries organic foods still only capture a small percentage of the total food market (www.organic-europe.net). Western Europe has led the way with Denmark and Germany having the highest percentage of organic

food purchased at rates of 3.5% and 3% of total food respectively (www.organic-europe.net/country_reports). Some organic products now capture a very large part of the market, nearly 30% of all oats and milk sold in Denmark are organic (www.organic-europe.net/country_reports). The organic market in Great Britain is also showing strong growth with sales there rising from 105 million British pounds in 1994 to 1213 million British pounds in 2004 (www.organic-europe.net/country_reports). This level of growth suggests that the purchase of organic food may be growing from only those who have a philosophical belief in organic food and into the shopping baskets of mainstream Western European consumers.

Considerable research has been done in the attempt to classify organic consumers by demographic profiling. The consumer profile resulting from these studies shows that the most regular organic consumer is a female, of working age, from the ABC1 income group who usually resides in a city (Baker, Thompson & Engelken, 2004; Roddy, Cowan & Hutchinson, 1996). This classification is not particularly useful as this really describes the typical food shopper in all categories in developed countries and fits with the study on European food consumption that concluded that women of working age still did most of the shopping and meal planning (Gracia & Albisu, 2001). A recent study of a representative sample of United Kingdom (UK) consumers found that the consumer group who was most likely to state a WTP for organic food are younger (25-54yrs) females, from social grade ABC1 who live in a rural area (Food Standards Agency, 2008). The majority of the studies listed below agree that the typical organic consumer is a female, of working age and from the middle to upper income range, although they each add other often contradictory factors to the picture.

Some studies suggest that organic purchase is positively affected by the incidence of young children in the household (Aarset et al., 2004; Fotopoulos & Krystallis, 2002). The finding here is that new parents become very concerned and aware of the foods they are feeding their children and so begin to purchase organic products. Younger people are more likely to list concern for the environment as a driving factor for purchase as well as to expressing a greater WTP for organic produce; however this expressed desire to purchase is not carried out due to financial constraints (Baker et al., 2002). This finding is in disagreement with the Food Standards Agency (2008) study which found that older shoppers (over 55 yrs old) were more likely to consider environmental issues when purchasing food. In a nationwide study into Greek consumers' attitudes towards organic food, Fotopoulos and Krystallis, (2002) found

that education is positively linked to awareness of organic food, which leads to an increased likelihood to purchase. Gil, Gracia and Sanchez (2000) found the opposite, that of the three consumer groups they identified the group with higher education was less likely to purchase and showed a lower willingness to pay for organic food. All these demographic and psychographic factors are important to consider. They should continue to be tested and reported on in order to monitor if clearer consumer profiles of regular and occasional consumers of organic products develop.

The profiling done in all of these studies agree on basic, broad consumer characteristics, however attempts to categorise organic consumers further do not seem to gain consistent support across a wide range of studies. This problem of no clear consumer profile is discussed in Hughner et al. (2007). They suggest that this lack of knowledge about organic consumers, especially occasional organic consumers, could explain why different studies show everything from consumers being confused about what the term 'organic' means to expressing frustration at the lack of availability of organic products (Hughner et al., 2007).

2.3   Approaches Taken to Studying the Purchase of Organic Food

Studies have been done using both qualitative and quantitative methods in many countries, especially in Europe. There are problems in directly comparing studies to see if their findings line up due to different methods, sample selections and questions being used in each survey. It also seems that studies from different countries draw differing conclusions. There seems to be a significant gap in the literature requiring a very large survey to be done across many countries and continents in order to make stronger conclusions about the organic food market as a whole.

The data collection methods used to generate the findings discussed below are quite varied. Studies by Padel and Foster (2005), Aarset et al. (2004), Schroder and McEachern (2004) and Baker et al. (2002) all use qualitative survey techniques to gather their data. The Aarset study uses focus groups and the Baker study utilises laddering interviews. The study by Padel and Foster (2005) uses both focus groups and individual laddering interviews to gain their data. The strength of the focus group technique is it provides an excellent platform for facilitating discussions and exchange of ideas between group participants in a way that is much more

dynamic than a person filling in a survey. A focus group is the best way to gain depth and understanding of issues in an under-researched area where the real issues may not be fully known or understood at the beginning of the focus group session (Aarset et al., 2004). Laddering interviews are a good progression from focus groups as they are more structured than a focus group while still allowing for participants to offer their own discourse on issues as they come up (Harper & Henson, 2001). A laddering interview aims to link simple behaviours (e.g., purchase of a particular product) with the underlying values that made the consumer purchase that product above any other alternative. In a laddering interview the interviewer will ask the subject a series of questions about why they chose this option or that option with the aim to progressively move from simple, perhaps seemingly random behaviours to uncover the deeply held values, beliefs or ingrained experiences that drive these behaviours. This idea is often explained as a means-end chain, which is a way of explaining the links between a behaviour or attribute, its consequence and the human value or value system that ultimately explains the behaviour (Reynolds & Whitlark, 1995). These studies only attempt to survey a limited number of consumers (32 in the case of Baker, 30 for Schroder) but aim to get a deeper look into what people think about organic issues and why they think these things. Due to their small sample sizes they do not claim to deliver generalisable results to whole populations (Baker et al., 2002; Padel & Foster, 2005). The Aarset study is a larger multi-country study where five groups of eight people in five different European countries were interviewed giving a total sample of 200. It is of interest that this large study came up with similar findings to the smaller studies regarding consumers' confusion about organics and what organic food actually is. These findings suggest that there is a general agreement regarding the lack of consumer knowledge about organic food.

Other survey methods have included using a fixed paper-and-pencil, questionnaire. Verhoef (2005) used a mail-out mail-back questionnaire requesting the main food shopper in the household to respond. The main advantage of this type of data collection is that it allows a large number of surveys to be sent out at a reasonably low cost. However this method can suffer from low response rates and does not allow flexibility to explore issues further in response to the answers given. In the study by Verhoef (2005) a random sample from the post office list was used to select 2000 households to send surveys, gaining a response rate of 15.5%. A study by Squires et al. (2001) used an in-store approach to gain participants, giving them a survey to mail back. They approached shoppers in one supermarket and four speciality shops in Christchurch, New Zealand, screening shoppers to ensure they were

organic food consumers before inviting them to participate in the study. Over the course of one week, 320 surveys were distributed; of these 154 valid returns were received. The Squires study gives a good indication of response rates that can be achieved in a study of a scale similar to what will be attempted in this project. A study by Krystallis and Chryssohoidis, (2005) used a structured questionnaire to attempt to gauge Greek consumers' understanding of the term "organic" and their willingness to pay for organic food. Of particular interest here is how they chose their sample: they approached shoppers in three supermarkets in Athens with a card providing 12 possible definitions for organic food. Only shoppers selecting the correct definition were asked to participate in the survey.

A major Eurobarometer commissioned study by Harper and Henson (2001) used focus groups to promote discussion about issues and find out what the consumers thought the issues actually were. They then used one-on-one interviews that were designed to probe deep into issues, allowing flexibility in the questions asked and giving the interviewer scope to explore issues in greater detail as the respondent discussed answers to the set questions. The first two parts of the study allowed the researchers to identify and gain a good understanding of the issues considered important by their sample, which allowed the researchers to subsequently design a survey that specifically addressed these issues. The main part of the study used a computer aided survey with a representative sample of 500 consumers from each of five countries using a set of questions based on the issues that had been identified from the focus group and in-depth interview stages. Such a study is ideal as it allows well researched questions to be asked of a large representative sample with a cross-country comparison. The range of techniques used allows for both qualitative and quantitative analysis techniques to be used on the collected responses. These factors allow the authors to make strong statements about the impact animal welfare has on food choice in Europe. The down-side of such a comprehensive study is the cost, which was 812,000 Euros.

2.4   The Attribute Approach to Looking at Products

There are many factors or attributes that make up an organic product. If we consider that an apple as a small round object has no particular value, it is the attributes of the apple that consumers purchase. The attributes that make up an apple are colour, texture, taste, juiciness, nutritional value and so on. Consumers value these attributes individually and then add them

to form their total perceived utility for that product (Hensher, Rose and Greene, 2005). This method of considering products was proposed by Lancaster (1966) in his work on attribute based consumer theory. McFadden (2001) in his Nobel Prize lecture provides a colourful exposé into the development, current and potential future direction of this method of looking at how choices are made. Which apple a consumer selects to purchase depends on which of the apples available best fulfils the desired attributes or combination of attributes and is within his or her budget. If the apple in question is an organic apple then additional attributes must be added into the decision mix. O'Donovan and McCarthy (2002) provide a detailed example of how cognitive purchasing models change when an otherwise identical product is organic. Consumers must now consider which, if any, of the organic attributes they desire. If they value many organic attributes, their WTP a premium for the organic apple is likely to be high; if they do not value any of these attributes, they are unlikely to pay any premium for an organic apple over a standard apple.

Constructing a list of the physical attributes of a product is reasonably easy; we can measure size, colour, crispness, weight etc with little trouble. What becomes difficult is to identify and quantify the more emotional or intangible attributes that are part of the make-up of an organic food product. The research reviewed in sections 2.5 and 2.6 details some ideas which are a good pointer towards additional attributes the consumer may see and consider of value when appraising an organic food product. For example, an organic food's chemical free status is such an attribute that would not exist in an otherwise identical but non-organic product and so add value to that organic product. Lancaster's (1966) view of looking at a product as a collection of attributes was an interesting theory but at the time of its conception lacked a statistical method that would enable empirical analysis of products viewed in this way to be undertaken. A following section on choice modelling will discuss the system that was created to enable such analysis to be performed.

2.5   Drivers for Purchase of Organic Food

The study by Hughner et al. (2007) is a significant meta-analysis of research done regarding the drivers and barriers to consumption of organic food. They identify key themes that have emerged from the body of research and group ideas into categories. These categories form

the basis for the following two sections which detail the reasons encouraging and reasons inhibiting the purchase of organic food.

The following five points outline the main drivers of consumption for organic food products.

Driver of Consumption 1 – Chemical Free: Concern for the Environment

A clear and consistent reason that consumers purchase organic food is because the production process required for products to have an organic status results in greatly reduced amounts of synthetic insecticides, fertilisers, hormones and drugs being sprayed on, fed to or injected into the plants or animals (Hughner et al., 2007; Padel & Foster, 2005; Verhoef, 2005; Thompson & Kidwell, 1998).

While most consumers of organic products are in agreement that reducing the amount of insecticides, fertilisers, hormones and drugs (foods using none of these are hereafter referred to as being 'chemical free') that go into the food they consume is desirable there seems to be two differing reasons or attitudes behind why people value this factor.

The first reason seems to centre on an altruistic attitude towards the environment (Botonaki, Polymeros, Tsakiridou, & Mattas, 2006; Padel & Foster, 2005; Verhoef, 2005; Chinnici, D'Amico & Pecorino, 2002). People who value the chemical free attribute in this way display a concern for the effects their lifestyle has on both the natural environment and the people and animals that live in it. These people are concerned about issues such as the carbon footprint of the goods they consume and consider sustainability as an important factor when choosing products to buy.

Driver of Consumption 2 – Chemical Free: Concern for Health

The second group who value the chemical free attribute of organic food do so for personal reasons. They are concerned by the possible health effects of spray residue on the fruit and vegetables they and their family consume. When purchasing meat they are concerned about the antibiotics and hormones that may have gone into conventionally produced meat

(O'Donovan & McCarthy, 2002; McEachern & Willock, 2004). These people value the chemical free attribute as an extension of their desire or concern for the long term maintenance of their health and the health of other family members (Hughner et al., 2007; Padel & Foster, 2005; Squires et al., 2001).

A study by Baker et al. (2002) suggests that culture may have an impact on which of the two groups desiring the chemical free attribute a person falls into. They find that consumers from Germany are likely to consider the broader benefits to society of consuming organics while consumers from the UK are more likely to give personal health as the reason for valuing this attribute. This is also shown in a study by Squires et al. (2001), which showed that Danish consumers purchase organics for environmental reasons while New Zealanders purchase organics more for health reasons.

Driver of Consumption 3 – Food Safety

It has been found that people purchase organic food due to concerns about the safety of conventional food sources (Schifferstein & Ophuis, 1998). This concern about food safety falls into two categories: one is through direct and immediate threat to health; the second is through longer term unknown effects.

Several major health scares regarding farm animals in Europe over the last ten years has been a considerable contributing factor to the growth of organics and specifically organic meat. Events such as outbreaks of bovine spongiform encephalopathy (BSE), commonly known as 'mad cow' disease, foot and mouth disease and *E.coli.* contamination have led consumers to question conventional methods of meat production and search for alternatives (Hughner et al., 2007). So far none of the previously mentioned problems have occurred at organic farms, thus organic meat is seen as a safer option (McEachern & Willock, 2004).

The second factor that makes up the food safety attribute is concern about longer term effects of eating conventionally produced food. The single main concern here is the increasing amount of genetically engineered food entering the mainstream food chain and the unknown effects that consuming this food may have on humans in the long term. If a food product is to hold organic status there must be no form of genetic modification of plants or animals or

giving animals feed that has been genetically modified (www.soilassociation.org). Numerous studies suggest that fear of genetic modification is a key reason for purchasing organic food, Padel and Foster (2005) and Rimal (2005) are good examples of these.

There is one other factor that could come under the food safety attribute and that is that organic produce is free from chemical residues which have an unknown effect on the body in the long term. Given that being chemical free is the main point of difference for organics it was decided that this attribute deserved its own section as discussed in Organic Attribute 2.

Driver of Consumption 4 – Animal Welfare Concerns

Another attribute consumer's value when purchasing organic meat is the assurance that animals have been treated in a humane way throughout their lives. This driver features strongly as a reason for why consumers purchase organic meat in several studies (Padel & Foster, 2005; Verhoef, 2005; McEachern & Willock, 2004). Animal welfare has become increasingly important and in many ways fashionable due to increasing negative publicity over some conventional methods of keeping animals, for example battery cages for hens (McEachern & Willock, 2004). Therefore, the desire to consume organic meat due to the belief that organically farmed animals have lived good lives may be driven by the need to ease one's conscience (Verhoef, 2005). With this attribute there does seem to be a major disparity between how much consumers say they value this attribute and how much of a change in behaviour actually results from ethical concerns. Schroder and McEachern, (2004) and Harper and Henson, (2001) note that consumers often remain intentionally ignorant about production methods to preserve their ethical standards taking a very hands-off approach to responsibility for the food they consume. Alternatively, consumers may simply suppress their ethical concerns and purchase food that is cheaper and easier to get hold of even if the products contravene their expressed ethical standards (Schroder & McEachern, 2004).

Driver of Consumption 5 – Enjoyment of Food/Taste

The enjoyment of food comes through in the literature as an important factor in the consumption of organic food. This attribute takes several forms in different research papers

but all link back to this overarching idea. Organic consumers often list superior taste as a reason for purchase (Lea & Worsley, 2005; Padel & Foster, 2005; Makatouni, 2002), although blind tests conducted on regular organic consumers comparing organic and non-organic products produced mixed results, with some organic products being preferred and some where no difference was shown (Fillion & Arazi, 2002). Also linked into the idea of organic foods increasing cooking and eating enjoyment is that organic foods are generally whole foods that are unprocessed and appeal to those wanting to cook in a more traditional way (Hughner et al., 2007, Krystallis & Chryssohoidis, 2005).

2.6   Barriers to Purchase of Organic Food

This section outlines the key reasons reviewed studies have found as to why consumers do not purchase organic food products.

Barrier to Purchase 1 – High Prices

In many studies price is given as the main reason why consumers shy away from purchasing organic products (Tregear, Dent, & McGregor, 1994; Zanoli & Naspetti, 2002; Botonaki et al., 2006; Food Standards Agency, 2008). Studies that attempt to gauge consumer WTP for organic products have a wide range of results. There has been no clear trend or price range that has emerged to suggest that producers/marketers of organic foods should charge a certain percentage premium that will be successful. Consumers have been found to be willing to pay premiums for organic foods ranging from 5% to 120% more than the non-organic option (Krystallis & Chryssohoidis, 2005).

Barrier to Purchase 2 – Availability and Marketing

The second key theme from existing research is that lack of availability of organic food products is a major reason why consumers do not purchase organic food (Lea & Worsley, 2005). Organic food options often do not enter the choice set for consumers because they are simply not available. It is difficult to demand something that is not there, thus producers and marketers cannot expect to grow demand without making consumers aware of the products on

offer and have them readily available for purchase. Consumers state that they would like to purchase organic foods and would be willing to pay a premium for them but they often cannot find a good range of organic food in the stores they usually shop at (Zanoli & Naspetti, 2002). Having to seek out stores that do sell organics foods and travel to those stores is usually considered too much of an effort to make it worthwhile.

Availability is a key driver behind this research project. As discussed earlier, organic lamb is produced in only very small quantities and therefore is neither well promoted nor readily available to the average consumer at their usual food purchase locations.

Barrier to Purchase 3 – Mistrust of Certification

The certification of organic foods and the standard by which an organic product is judged is not universal and therefore creates confusion and mistrust in consumers (Botonaki et al., 2006). Consumers often do not understand the meaning of what is being certified or claimed on packaging and confuse organic farming with other farming methods such as free-range (Harper & Makatouni, 2002). There are several different companies offering organic certification within New Zealand, and the problems with setting a clear organic standard increase markedly when dealing with products grown and certified overseas. It therefore becomes very difficult for consumers to know exactly what is meant when something is marketed as organic and they may struggle to have trust in the products they are buying. The lack of confidence in certification leads to a reduction in a consumer's WTP for organic products - although the opposite situation also applies. If consumers do trust the certification system attached to the organic product then Krystallis and Chryssohoidis (2005) have found that this increases WTP for organics.

Barrier to Purchase 4 – Happy with Conventional Food

Another common reason given for consumers' unwillingness to pay for organic food is that they are satisfied with the quality, taste and safety of their current, conventional food source (Roddy et al., 1996). While no studies have dealt with this specific question in New Zealand,

it is expected that this factor will be particularly applicable here due to the naturally clean conditions our food is currently grown in and the lack of food safety scares in New Zealand.

Barrier to Purchase 5 – Cosmetic Defects

There has been some research which suggests that cosmetic defects in organic food is a reason consumers will reject it especially organic fruit and vegetables. In the earlier days of organic food growing it was accepted that the end product would often have marks or other blemishes on it (Misra, Huang & Ott, 1991). Consumers who were committed to purchasing organics accepted this, but it was given as a reason for rejection of organics and unwillingness to pay extra for them in studies by Ott (1990) and Thompson and Kidwell (1998). These studies are now quite old and due to research and improved growing techniques organic produce is now grown to a high standard of quality. Present-day consumers should be seeing fewer blemishes in the end produce which should be of comparable quality to regular produce (Liebhardt, 2001).

2.7 Choice Modelling

As discussed earlier there have been many studies done using both qualitative and quantitative research techniques that have attempted to understand what the values and attitudes are that cause consumers to purchase or not to purchase organic food. The larger multinational studies that have been discussed utilise a combination of techniques that are particularly useful. However, what these studies do not achieve is a measure of consumer willingness to pay (WTP) for organic products. The purpose of this study is to specifically quantify WTP for organic lamb and identify the attributes of the organic lamb that consumers value most. Because the study aims to gauge actual levels of WTP the study must utilise a survey and analysis technique which is capable of delivering a WTP measure. This allows the researcher to build a clear picture of what consumers will pay given particular attribute levels of the lamb. Choice modelling (CM) is a technique which fulfils the above-mentioned requirements.

Other research methods give very good results when seeking information on attitudes or values and can provide useful purchase behaviour information but are not suitable for testing WTP of a new product given the need to hypothetically vary the attributes of that new product to see which are most valued. A good example of this is the study by Aarset et al. (2004) which has the goal of testing the acceptability of a new product (organic farmed salmon) which in many ways is similar to the goal of this study which is testing consumer demand for the relatively new and not readily available product of organic lamb. The Aarset study used focus groups and provided a good indication of what consumers thought about the product and the issues they had with it but could not give any accurate WTP measure.

The following paragraphs will introduce the ideas behind CM and who proposed and developed these theories. Following that, the formula known as the multinomial logit (MNL), which is a mathematical tool used to analyse CM data, will be introduced.

Recognition for pioneering thinking in this field is generally accredited to Lancastrian consumer theory (Loureiro & Umberger 2007). Lancaster, (1966) proposed that when considering the choice between different products consumers deconstruct the products into a series of attributes and weigh these attributes separately to attach utility to them. The random utility model (RUM) was proposed by Jacob Marschak (Batley & Daly, 2006). Basically this theory states that when presented with a range of options consumers will choose the one they think will provide them with the maximum possible utility (for a full discourse on work surrounding this topic see Marschak, 1974). Therefore, the higher the utility of a particular option the higher its probability of being selected. A test subject is offered a range of options and simply asked to identify which option they prefer. Given that choice modelling (CM) is a process where individuals make choices between options that contain a number of attributes with different levels (Burton, Rigby, Young and James 2001). Lancaster's and Marschak's work formed the all important first steps in developing this way of thinking about choices. According to Burton et al. (2001) CM arrived as a useful and practical method of studying choices with the work of Daniel McFadden, for which he won a Nobel Prize in economics. McFadden (1974) provided a mathematical way of analysing random utility theory. While there are variations, adaptations and advances to McFadden's original formula, today's working example remains very similar to the original. The most important choice model according to Hensher, Rose and Greene (2005 pg 85) is McFadden's multinomial logit (MNL) which can be explained through the series of equations that are presented below. The

following series of equations relies heavily on *Applied Choice Analysis, A Primer* by Hesher, Rose and Greene (2005).

The above discussion regarding utility and product attributes can be shown in the following equation. A consumer's utility level for a particular option *i* is given as:

$$U_i = V_i + e_i \qquad \text{(Equation 1)}$$

Where U_i is made up of an observable component V_i and an unobservable component e_i. The error term recognises that the researcher cannot hope to capture all the attributes that every respondent considers when making choices about the product at hand. In order to make the model useful it is necessary to capture the attributes that make up the utility function and attach values to them, which leads to:

$$V_i = \sum \beta \, X_i \qquad \text{(Equation 2)}$$

The observed component V_i is the sum of the attributes, *X*, of the ith choice with their respective weightings, β.

To provide an example of how this works the following demonstrates a simple choice modelling question regarding meat purchase.

Attributes	Option 1	Option 2
Farming method	Traditional	Organic
Price per kg	100% (current prices)	125%

The consumer must make a choice deciding if the utility they gain from purchasing organic outweighs the price premium. If it does not they will stick with their traditional meat supply. In this example we can observe the effect of production method on price, our observed component, however there are many other attributes such as availability or price that may go into the decision between option 1 and 2 that are not captured in such a simple choice set. These factors would be captured in the error term in this example.

Substituting these attributes into the above equation gives

$$U_i = \beta_1 ORG_i + \beta_2 PAY_i + e_i \quad \text{(Equation 3)}$$

Where U_i is the utility obtained by the consumer when they select option i from the choice set. ORG is the variable indicating the use of organic farming as the growing condition and PAY is the price required to obtain the choice option i. β_1 and β_2 are the parameters we must try to estimate.

In the example given above the consumer will choose option i over option $j, j \neq i,$ if they decide their total utility is $U_i > U_j$. Statistical analysis must be done to calculate the estimates of the β parameters so that the predicted choices will match closely the actual choices that are revealed in the survey. McFadden (1974) showed that the random utility model can be estimated by the multinomial logit model (MNL). This is also discussed in detail in Louviere, Hensher and Swait (2000).

The MNL is based on a specific distribution of the error term. Hensher et al. (2005, pg 84) suggest that the extreme value type 1 (EV1) originally proposed by McFadden (1974) is an appropriate distribution that has stood up in practice over a period of time. The EV1 is notated as follows:

$$prob\left(\varepsilon_i \leq \varepsilon\right) = \exp\left(-\exp(-\varepsilon_i)\right) \quad \text{(Equation 4)}$$

As mentioned previously the error term forms the part of the utility equation that the surveyed attributes do not capture. By carefully choosing the attributes considered for a survey it is possible to minimise the error term but not to eliminate it.

It was through this specification of the error term that McFadden created the MNL. This gives us the ability to use the MNL to model the discrete choice data from our sample. The following equation gives the probability that choice Y of a person q is option i from a pool of J options.

$$prob\left(Y_q = i\right) = \frac{\exp(V_i)}{\sum_{j=1}^{J} \exp(V_j)} \quad \text{(Equation 5)}$$

Substituting in the attribute and level equations detailed in equation 2 gives:

$$prob(Y_q = i) = \frac{\exp\left[\lambda \sum_{k=1}^{K} \beta_k X_{ki}\right]}{\sum_{j} \exp\left[\lambda \sum_{k=1}^{K} \beta_k X_{kj}\right]} \text{(Equation 6)}$$

In this equation i represents the choice made and X_k (k=1,…,K) are the K attributes of the choice made. The parameter λ is a scale parameter which is inversely related to the variance of the error term (Burton et al, 2001). This parameter cannot usually be identified and so is typically assumed to be one (Hensher et al., 2005). This means in the equation above the λ term can simply be dropped out.

For the MNL to work an assumption is made that the error term is both independent and identically distributed (known as the IID assumption, see Hensher et al. 2005 pg. 77 for further discussion of this assumption). If it is deemed desirable to relax the IID assumption then McFadden and Train (1998) have shown that the more complex multinomial probit model could be used. Other alternatives for relaxing the IID assumption are covered by Hensher et al. (2005, chapters 13-16) and by Louviere et al. (2000, chapters 6 & 7) where they discuss options such as the nested and mixed logit models. However for this study the assumption of independence and identical distribution of the error term is made.

With CM we are also trying to allow individual-specific characteristics to be incorporated into the choice options and capture them to explain the choices made. The following equation allows the utility gained from the choice of an option to vary from person to person.

$$U_{qi} = \sum_{k} \beta_k X_{ki} + \sum_{m} \alpha_m Z_{mq} + e_{qi} \quad \text{(Equation 7)}$$

In this formula q represents the individual and Z_m is the characteristic m of that individual (e.g. income level) that may affect the utility that person assigns to that option. Burton et al

(2001) have demonstrated that the Z terms do not change within subject for different choices because the personal characteristics of the individual remain constant across all choices.

The following formula gives the utility gained by a person q with m characteristics when they select option i given option i's attributes k

$$U_{qi} = \sum_k \beta_k X_{ki} + \sum_k \sum_m \alpha_{km} X_{ki} Z_{mq} + e_{qi} \quad \text{(Equation 8)}$$

To get the probability of person q choosing option i use:

$$prob(Y_q = i) = \frac{\exp\left(\sum_k \beta_k X_{ki} + \sum_k \sum_m \alpha_{km} X_{ki} Z_{mq} \right)}{\sum_j \exp\left(\sum_k \beta_k X_{kj} + \sum_k \sum_m \alpha_{km} X_{kj} Z_{mq} \right)} \quad \text{(Equation 9)}$$

This formula is the MNL and is the tool this study will use to analyse the choice modelling survey data that is collected.

2.8   Factor Analysis

Factor analysis is a process where a large set of variables (in this study attitudes to organic food and production methods) can be reduced down to a smaller number of underlying constructs called factors. These factors explain the key meta-attitudes underlying the original observed attitudes collected in the survey. The output of factor analysis is to give a loading to each survey variable which, when attached to the individual, explains how important each variable is in explaining the underlying meaning of the factor. The following section explains how factor analysis operates in general and the specific options used to create the factors for this study.

The main premise of factor analysis is that the observed variables form linear combinations of some unobserved or hypothetical underlying factors (Kim & Mueller, 1978). Factor analysis itself was invented by psychologist Charles Spearman in 1904 when he proposed a theory that

suggested individual or specific measures of intelligence could be explained by an overall intelligence measure (Bartholomew, 2005). Factor analysis is now used in many academic fields, including marketing.

Factor analysis works in three main steps, which are to prepare the covariance matrix, extract the initial factors and rotate to a final solution (Kim & Mueller, 1978). For this study the computer package SPSS version 15 will be used and so the discussed options for how to go about these three steps will be kept to options offered by this system. SPSSv15 offers seven possible extraction methods: they are principal components, unweighted least squares, generalized least squares, maximum likelihood, principal axis factoring, alpha factoring, and image factoring. Each method has its advantages and disadvantages, a discussion of which is beyond the scope of this paper. The most common method of extraction, and the default setting in SPSSv15 is principle components analysis. Unless there is a problem with the results gained by this method or the user is experienced in factor analysis it is suggested that this method be used in most cases (Manly, 2005). The rotation method used, if required, depends on whether or not correlation exists between the factors. If there is no correlation between factors then an orthogonal technique for rotation is appropriate; if correlation does exist then an oblique rotation technique will need to be employed (Darton, 1980). Again there are several methods of orthogonal and oblique rotation available and the selection of which method to use depends on the requirements of the user. SPSSv15 offers the user the choice of Varimax, Quartimax, Equamax (orthogonal) and Direct Oblimin or Promax (oblique) rotations.

The following formula explains the underlying process for factor analysis for the dataset

$$X_{a,n} = \ell_{1,a} F_{1,n} + \ell_{2,a} F_{2,n} + \ell_{3,a} F_{3,n} + e_a$$

Where:

- $X_{a,n}$ is the score for the ath attribute for the nth individual
- $\ell_{1,a} F_{1,n} \ldots \ell_{3,a} F_{3,n}$ is the factor loading for factor 1, 2 and 3 for the ath attribute
- e_a is an error term indicating the value not captured by a

(Formula adapted from Manly 2005)

There are many good computerised statistical packages that perform these calculations for the user; in this project SPSS v15 was used.

2.9   Cluster Analysis

Cluster analysis is a technique and process where groups of respondents are formed based on their similarity to each other in terms of demographic and psychographic responses collected by the survey. The purpose of cluster analysis is to identify groups of respondents in a data set that have characteristics which, within the cluster, are as similar as possible and at the same time are as different as possible to respondents in other clusters. This process allows the researcher to create profiles of the consumers in the clusters identified. The researcher can look at the clusters and say people in cluster 1 have demographic characteristics x, y and z and think a, b and c about organic food and production methods. This information is helpful in applying the results of the study into a market situation, meaning the practitioner can use the information to create appeals that target the correct types of people.

There are two main forms of cluster analysis; the first is hierarchical clustering which begins with all cases as individual clusters and ends with all cases in one giant cluster (Manly, 2005). The second form is k-means cluster which works by partitioning, with cases moving in and out of groups as the number of groups changes until a stable result is achieved (Manly, 2005). Deciding on the correct number of clusters can be challenging as it is "more of an art than a science" (Hair, Anderson, Tatham & Black, 1995, pg 455). It is suggested that a decision can be made on the appropriate number of clusters if a sudden jump is observed in the distances between steps. Alternatively, and more commonly, decisions on number of clusters are made by running cluster analysis specifying several different numbers of clusters and comparing the results with *a priori* knowledge about the relationships at play to come to a judgement about the appropriate number of clusters for the given data set (Hair et al., 1995).

For continuous variables, cluster analysis works by measuring the Euclidean distance between two objects and making decisions on where to place that object relative to other objects in the data set. The formula for the Euclidean distance function is as follows:

$$d_{ij} = \left\{ \sum_{k=1}^{p} \left(x_{ik} - x_{jk} \right)^2 \right\}^{1/2}$$

Where d_{ij} is the distance between objects, x_{ik} is the value of the variable X_k for the object i and x_{jk} is the value of the same variable for object j (Manly, 2005).

2.10   Chapter Summary

This chapter reviewed existing literature about the types of people who regularly consume organic food, the drivers for and barriers towards consumption and reviewed the methods these studies have used. The drivers for consumption suggest that when considering the purchase of organic food, often it is a consumers' desire to avoid a possible negative thing that drives them to consume organics as opposed to a particular positive benefit of the organic food. If we consider that organic food is a 'pure' food source and other food sources are 'adulterated' (by genetic engineering or chemical sprays for example) then consumers desire organic food because it is not genetically modified or it does not have chemical residues.

The key analytical techniques that will be used to analyse the survey data were then detailed. These techniques, factor analysis, cluster analysis and choice modelling will allow consumer attitudes to be analysed, consumer profiles constructed and WTP measures for the tested attributes to be made.

Chapter Three – Hypotheses

3.1   Overview

The literature review undertaken in chapter two combined with the researcher's expectations of what will happen in the New Zealand market has lead to six hypotheses being constructed as guiding questions for this research. These hypotheses fit with the key research objectives and seek to fill, at least partly, the research gaps that are identified in the following section.

3.2   Research Gap

There is a general lack of information available regarding a consumer profile of who regular consumers of organic food are in New Zealand. The study by Squires et al. (2001) suggested that New Zealanders as 'novice' organic food consumers will have different reasons for organic consumption than 'mature' organic consumers from Denmark. This study did not construct a useful consumer profile of who regular consumers of organic food are, but suggested that New Zealand organic consumers are motivated by personal health concerns and 'personal eco-identity'. Danish consumers, on the other hand, had a wider environmental focus as the main driver of their consumption. So the first research gap is in the need to gain a better understanding of New Zealand regular consumers of organic food. As discussed in section 2.2 considerable debate exists around consumer profiles for regular consumers of organic food. This research will also add to the body of information on this subject.

The second research gap centres around the lack of research on the likely success of an organic lamb product. The researcher is unaware of any published studies that attempt to directly answer this question. There are some studies that deal with attitudes to and prices for organic meat; a study by Lohr (2001) states an average premium for organic meat in Germany of 52%. O'Donovan and McCarthy (2002) found that only 4% of Irish consumers were willing to pay a premium of 26% or more for organic meat. Lusk and Schroeder (2004) tested willingness to pay (WTP) for different brands of beef steaks but did not test an organic product. Any effort to increase knowledge of consumer attitudes to organic meat would be a

useful addition to the body of knowledge. A clear gap exists for a study into consumer WTP for an organic lamb product. This study will do this as well as adding WTP measures for other attributes of lamb which will be useful for lamb producers and marketers so they can better understand the preferences of their target markets.

3.3   Hypotheses

The literature review in chapter two, the key objectives of the research outlined in 1.3 and the research gaps identified in 3.2 lead to the following set of hypotheses that will act as a guide for this research.

H1: Consumers who state they are concerned about the impact they have on the environment will show an increased willingness to pay for organic lamb.

Environmental concern is shown in 2.4 to be a key driver for European organic food consumption. It is thought that despite New Zealand society often displaying little regard for preserving our 'clean, green' image (Tandy, 2006; Taylor, 2008) those consumers who are concerned about the environment will be more likely to pay more for organic lamb.

H2: Consumers who are concerned about and feel responsible for their own health will show an increased willingness to pay for organic lamb.

This hypothesis is to test the finding of Squires et al. (2001) who found that this was the main predictor of New Zealand consumers' consumption of organic food. It is of value to test this finding to see if this still holds up eight years later as a key indicator of organic consumption.

H3: For New Zealand consumers, food safety concerns will NOT positively affect the purchase of organic lamb.

New Zealand has not experienced the major animal health scares such as foot and mouth disease, BSE ('mad cow') or *E.coli* outbreaks that have caused problems in Europe. New Zealand raised meat is also not grown under conditions where animals are fed animal by-products, hormones and antibiotics as a regular part of their diet (www.newzealandlamb.org),

practices which are thought to have potentially harmful health effects for humans (Kidd, Rossignol & Gamroth, 2002; Mellon, Benbrook & Benbrook, 2001). Therefore it is thought that New Zealand consumers' food safety concerns will not lead them to link organic food with increased food safety.

H4: Consumers who reject feedlot production methods will show an increased WTP for organic lamb.

Feedlot production as a method of raising animals is the antithesis to organic production standards. Therefore it is thought that consumers who have the strongest aversion to purchasing lamb raised under feedlot conditions will also show the highest WTP for lamb grown under organic conditions.

H5: Consumers will have a lower WTP for organic lamb if it is not available in their usual place of food shopping.

As mentioned in the literature review the difficulties with the availability of organic food is seen as a major reason why consumers do not purchase it. Thus this hypothesis predicts that consumers will show a lower WTP if the lamb is not available at their supermarket so they are forced to make more effort in order to make a purchase.

H6: Certification of the product will increase WTP for organic lamb.

Although lack of trust in certification labels is listed as a barrier to organic food purchase in 2.5 the researcher predicts that independent certification of the lamb product will be an attribute that attracts a positive WTP measure from New Zealand consumers. This suggests that the independent certification will be seen as a trusted measure by New Zealand consumers.

Chapter Four – Research Methodology

4.1   Overview

This chapter details the design of the research, the survey development and the implementation of the survey in the field. Of particular interest is the use of computer aided personal interviewing (CAPI) to deliver the survey, the difficulties of using this tool and how it performed as a delivery method for the choice modelling section.

4.2   Research Design

Considerable thought went into deciding how to collect the data for this study. Options considered were to use a sample from the Lincoln University student population. This sample would have been very easy to collect, low cost and, due to the make-up of the student population, the study could have looked at cross-cultural differences. It was decided this was not a good option however, as this sample would not have been at all close to the general population or even the typical food shopper. A mail-out survey using a random sample of the general population was considered but this was rejected due to concerns about response rate and the desire to test the touch screen computers as a delivery method for a choice modelling questionnaire.

It was decided that the way to best capture consumer responses in an applicable environment was to conduct face-to-face surveys of consumers as they shop for food using the touch screen computer technology. It was also decided that the study should be limited to consumers who at least occasionally consume organic food and also consume lamb. This restriction was made as it was felt that this meant respondents could reasonably be considered to be potential consumers of an organic lamb product in the future. It was decided that the research should take place in specialist organic food stores and supermarkets that had a reasonably large organic food range to increase the likelihood that people shopping in these stores would be potentially suitable respondents.

4.3   Variables and Measurement

The questions that formed the 12 attitudinal questions were designed to gain an understanding of New Zealand consumers' views on organic food and production methods as well attitudes towards their own health and the environment. In the original version of the survey there were 17 of these questions but it was reduced to 12 in the final survey (see section 4.5). The questions were designed to provide answers to the hypotheses and enable fulfilment of the key research objectives.

Table 1:Key Research Questions, Hypotheses and Measurement

Research Concepts and Hypotheses	Measured by response to these values and questions
What attributes of lamb do consumers value the most?	WTP values from the choice modelling questions.
Do consumers show a demand for organic lamb?	Organic WTP measure compared to other production methods WTP measures.
NZ consumers' vs European consumers' attitudes and demographic profiles.	Attitudinal questions, applicable WTP measures and demographic questions.
H1 – Consumers who state they are concerned about the impact they have on the environment will show an increased WTP for organic lamb.	- Organic farming methods are better for the environment. - I am concerned about the impact I have on the environment. - WTP for organic lamb.
H2 – Consumers who are concerned about and feel responsible for their own health will show an increased WTP for organic lamb.	- Organic food is better for me because it does not contain chemical residues. - What I eat has a big impact on my health. - WTP for organic lamb.
H3 – For NZ consumers food safety concerns will NOT positively affect the purchase of organic lamb.	- Organic foods are safer than GM foods. - Organically farmed animals do not suffer from foot & mouth disease or

	BSE.
	• WTP for organic lamb,
H4 – Consumers who reject feedlot production methods will show an increased WTP for organic lamb.	• How animals are treated is an important factor in my food choice.
	• WTP for organic lamb compared to feedlot production.
H5 – Consumers will have a lower WTP for organic lamb if it is not available in their usual place of food shopping.	• Organic food is too hard to find in the places I usually shop.
	• WTP for supermarket as purchase location
H6 – Certification of the product will increase WTP for organic lamb.	• I do not trust organic labelling.
	• WTP for certification.

The attributes and levels used in the CM section of the survey are given in the table below. These attributes reflect the goals of the study and will allow a WTP measure to be made for each of these five attributes.

Table 2: Attribute Levels

Attribute	Level					
Price $/serve (150g)	3.98	4.43*	4.87	5.53	6.64	8.83
Availability	Regular Supermarket		Speciality Shop		Farmers Market	
Production Method	Intensive feedlot		Grass fed		Organic	
Colour	Red		Red/Brown		Brown	
Intramuscular Fat (marbling)	Slight marbling		Moderate marbling		Abundant marbling	
Branding	No branding		Branded		Branded and certified	

*This price was calculated by taking an average of five prices for lamb cutlets at Christchurch supermarkets and butchers on the 15th of May 2008. The other prices are varied according to the percentages discussed below.

Price is essential in order to gain WTP measures for the other tested attributes. The reference point for price is an average of the price for a selected cut from two supermarkets and two butchers. The price is varied below this figure by 10 % and above by 10, 25, 50 and 100 %. The reason there are more price categories above the market average price is that organic is

seen as being a value added attribute. This study is interested in finding WTP for organic lamb. According to the Ministry of Agriculture and Fisheries (2001) organic products are more difficult and/or expensive to produce. Therefore any overall negative result for WTP for the organic attribute means the organic concept is not one commercially minded farmers would be interested in pursuing. As mentioned in the organic food literature review section price is consistently listed as the most important barrier to purchase.

Availability is another key barrier to purchase identified in the literature review. Availability is especially relevant to this study due to the lack of supply from the big meat producers/marketers. This attribute is designed to test how sensitive consumers of lamb are to convenience and/or how committed they are to purchasing favoured products. Three options for purchase location are presented: the consumer's regular place of food shopping (e.g. local supermarket), a speciality shop or a weekend farmers market.

Production method is critical to this study as it is the central concept being tested. The three production methods that are offered are intensive feed-lot farming, traditional pasture farming and organic pasture farming. A short paragraph outlining what is meant by these production methods was offered to the consumer prior to starting the survey if they chose to seek clarification on these production methods.

Taste and tenderness are probably the most important attributes of lamb to determine the consumer's satisfaction having consumed the product. Unfortunately unless we cook and serve meat to the consumer when they are being surveyed these attributes are not directly testable. Attributes that act as indicators of taste and tenderness that consumers may use are the visible attributes of colour and intramuscular fat. The colour of the meat was varied with three levels presented: a bright red option, a darker, almost brown option and one in the middle. Three levels were also presented for intramuscular fat with options being slight marbling, moderate marbling and abundant marbling.

The final attribute tested was the effect branding and certification has on WTP for organic lamb. This was tested by having three levels of branding with level 1 as unbranded, level 2 as a nationally recognised brand (Tegel for example) and level 3 being a nationally recognised brand with government certification stating that all claims about the product (its organic status for example) are true.

4.4　Questionnaire Design

To achieve the key objectives of the study (to test consumer attitudes towards organic food and production methods and to assess the potential demand of and WTP for an organic lamb product) a survey was created by the researcher and adapted to fit the required format for the touch screen computers[1]. The survey questions were organised in three parts. Part one dealt with attitudes towards organic food with the aim to test New Zealand consumers' attitudes towards organic food and enabled comparison of those attitudes to European consumers' attitudes as discussed in the literature review section. Part two is the choice modelling section (creation of this section discussed below). Part two aims to isolate which attributes of lamb consumers consider most important, to answer the question is the 'organicness' of the product an attribute that is valued, and what the WTP for each of the tested attributes is. Part three collects demographic information about the respondents to enable the sample to be compared against New Zealand census data to check how representative of the general population the sample is and to enable the creation of consumer profiles for comparison with other studies and for marketing recommendation purposes.

A full factorial design is a design that captures every possible combination of attributes and their levels. This is ideal as it means that no possible options are missed. However the problem with a full factorial design is that with any more than two or three attributes with two levels the design quickly becomes very large and virtually impossible to administer. The way to get around this scale problem is to use a fractional factorial design. A fractional factorial design takes only a small number of the full factorial design to create a design that captures the options with a much smaller number of observations required; Kuhfeld (2005) and Hensher et al. (2005) demonstrates how this process operates. It is efficient, as it gives the ability to select the smallest number of observations possible while still capturing the range of the full design.

The efficiency of the design is due in a large way to the ability of the researcher and survey designer to estimate the likely outcome of the data collection. With the MNL we measure the

---

[1] Rachel Wells from Touch Screen Marketing Research performed this service.

relative weights of the attributes. In turn, these ultimately give the ability to make conclusions about which attributes are most valued. If the survey designer can estimate what these weightings are likely to be or at least which will be positive and which negative, this allows the creation of a much more efficient survey design.

The choice modelling survey design used for this project is a D-efficient choice design[2] with the attributes and levels chosen by the researcher. A D-efficient design was chosen as it represents a well established method of choice design that is suitable for a wide range of choice experiments (Kanninen, 2002; Kuhfeld, 2005; Kuhfeld, Randall & Garratt, 1994). There are more complex designs in existence that may be better depending on the type of analysis the researcher is planning to use (e.g. bayesian efficient designs). For the purposes of this project a well constructed D-efficient design is more than adequate given the relatively simple choice models that will be run on the results.

Of special interest in this project's data collection process is the use of computer aided personal interviewing (CAPI) to collect the data. This technique allows consumers to answer questions using touch activated screens on portable computers that can be set up in store. This technology enables consumers to quickly and easily enter their responses and eliminates incomplete or unusable surveys (Bronner & Kuijlen, 2007). They are also easier to complete for the participant than traditional pen and paper surveys (Levinson, Paltiel, Nir & Makovki, 2007). This technique is becoming more popular as computer technology becomes much more portable. It was used in the Harper and Henson (2001) study whose methods have already been discussed, by the Food Standards Agency (2008) study and by Hensher (2006) in a CM study regarding public transportation options.

4.5   Pilot Testing

The survey was initially created with 17 attitudinal questions and a detailed description of each attribute of lamb that was being tested in the choice modelling section (see appendix A for the attribute explanations). Different layout options were tested on co-workers, flat-mates

---

[2]The design was created by Dr Bill Kaye-Blake using a spreadsheet method set down by Dr John Rose (ITLS, University of Sydney).

and friends, resulting in a survey that appeared to be clear and easy to follow. The test subjects completed the survey in good time with a clear understanding of what was required. The survey was then deemed ready for pilot testing in a store that was participating in the project. Unfortunately participants in this pilot test had considerable difficulty with the survey. It was taking 10-12 minutes for most people to complete; they were getting bogged down by the volume of reading, getting frustrated about the number of questions and the time it was taking to complete the survey. The message from this pilot testing process seemed to be that there is a considerable learning process that takes place with this type of survey especially in dealing with the choice modelling section. When a person, such as the friends and workmates who had been pre-testing the survey, has seen the survey more than once and understands what is required they can complete the survey very quickly. The first exposure to the survey, however, seemed to require significantly more time and mental energy on behalf of the respondent in order to grasp the requirements of and complete the survey.

The researcher decided that it was unacceptable to present a survey taking this long to customers in a shopping environment. It was felt that 10-12 minutes was too much of a person's time to request and would result in great difficulty in collecting the required sample size. To rectify the time issue 5 attitudinal questions were omitted, as were the lamb attribute explanations. The attribute explanations would now be provided on paper for the participants' consideration if desired, but participants would also have the option of not looking at the explanations. While this may mean that not all participants fully understood the attributes or potentially defined the attributes differently from the researcher's intention it was felt that this was an acceptable and necessary trade-off to reduce the time of the survey. A possible benefit of this change is that it may in fact more accurately reflect actual buyer behaviour where people would very likely have different personal definitions of the attributes presented. The changes were successful and brought the average time of completion down to around 5 minutes. Based on participants' reaction the researcher observed that the majority of shoppers considered this to be a reasonable amount of time.

4.6   Data Collection

The final survey asked respondents a question each about organic food consumption frequency and lamb consumption frequency, had 12 organic food attitudinal questions

utilising a 5-point Likert scale and 8 choice modelling questions, and collected demographic information on respondents' age, gender, marital status, number of children, household income and education level.

According to Hensher et al. (2005) there are no clear rules to guide the researcher as to the correct sample size for this type of experiment. Assuming the choice experiment is well designed, Hensher et al. (2005) suggest that as a minimum requirement at least 50 responses per survey block is required to enable statistically robust conclusions to be drawn from the survey data. This study design featured 3 separate blocks and therefore the suggestion is that 150 surveys would need to be completed. It was the aim of this study to collect 200 completed surveys from each city, which would provide an ample number to enable good statistical analysis and defensible conclusions to be drawn from the data gathered.

In order to participate in the survey a consumer needed to have purchased an organic food product at some point in the last year and to have purchased sheep meat at some point the last year. These screening criteria ensure that those sampled were not hostile towards the product category being tested and due to prior purchasing habits could realistically considered to be potential consumers of an organic lamb product. The screening is necessary due to the relatively low levels of consumers in the general population who regularly consume organic products. There is strong support in the literature for pre-screening potential survey participants in order to target a study at particular groups who do or are more likely to consume the product being discussed than members of the general population. Examples from the literature of targeting particular customers are ensuring participants are knowledgeable about organic food (Krystallis & Chryssohoidis, 2005), that they actually consume organic food (Squires et al., 2001; Baker et al., 2004) or that they live in a particular location (Padel & Foster, 2005). What this method allows is accurate measures of desired attributes and WTP to be made about those members of the public who purchase lamb and who purchase organic food. This category of people, however much reduced in number from the total population, is worth considering due to the previously discussed facts regarding the size of the organic food market, its strong and steady growth as well as price premiums typically generated by organic food products.

The study gathered primary data from two cities, one North Island (Wellington) and one South Island (Christchurch) in New Zealand. This provides a gauge of consumer attitudes to

organic lamb in two major metropolitan areas of New Zealand. The data was collected in nine supermarkets and organic food shops in Christchurch and Wellington. The supermarkets chosen all had reasonably large organic food sections (for example the local Pak n Save, a low-price supermarket, was not considered a good choice) to increase the likelihood that the consumers in the store would be suitable candidates for survey participation.

Table 3: Data Collection Locations

Christchurch	Wellington
The Bush Inn Centre	New World Metro
Merivale Mall	New World Thorndon
New World South City	Moore Wilson
New World St Martins	Commonsense Organics
Opawa Organics	

The survey was administered by the researcher with assistance from three research assistants from Lincoln University. In most locations the data collection process proved to be quicker and easier than first expected with, on average, more than the required sample being collected in around 10 hours of surveying. This was less time per store than had been expected, with two full days being allocated for each store at the planning stage. In general most people were happy to participate in the survey, especially when they became aware that the project was for a student's thesis and not commercial research. The approximate time of five minutes to complete the survey also did not prove to be a barrier to most people.

The only places were data collection was not as fast were in the two organic stores and in Merivale Mall in Christchurch. The two organic stores did not yield the required sample in two days of surveying due to low traffic flow in the stores. Both store managers commented that their stores were unusually quiet which may have been a result of inclement weather in three of the four days surveying at the organic stores. Consumers at the organic stores were also often keen to discuss the project and organic food in detail, often resulting in each survey taking considerably longer to complete than in other stores. This impacted on collection rate, as while the survey was in progress other potential respondents were being missed. Data collection was also slow in Merivale Mall. This location was different to the other sites as the researcher was stationed in a main area of the Mall as opposed to in or at the entrance to the supermarket/organic store. It proved very difficult to get people to stop and engage with the

researcher in order to be invited to participate in the survey. It is the opinion of the researcher that in this setting people are used to being asked to sign up to something or give money to some cause and so are conditioned to dismissing requests without even having any idea what it was that they are ignoring. Those who did stop and had the project explained to them responded in a similar way to people in the other stores and were generally happy to participate. Interestingly, a group of school girls with clipboards seemed to be having much greater success with their survey than the researcher did. This anecdotal observation backs up the idea that it was the location and professional presentation of the researcher with the touch screen computer that was the barrier to participation in this situation.

Three types of touch screen computer were available for use, a free standing kiosk, a desktop PC and a portable tablet PCs. During the research all three available types of computer were utilised as appropriate in different settings. The free standing kiosk was good as it created a substantial visual impact. The desktop PC provided a nice clear picture, did not require much space and was easy to transport. The motion tablet was used in the New World Metro supermarket in Wellington. This store in the Wellington CBD was a sort of fast-food supermarket that had very high shopper numbers with a low average spend. Shoppers would typically be purchasing for one or two meals or for immediate consumption. As these people were usually in a great hurry it was hard to get them to stop and take 5 minutes to complete the survey. However at this store in peak times (lunchtime and after work) the queue would extend right to the back of the store and would take around 10 minutes to get from end of line to check-out. The motion tablet computer fitted this situation perfectly. The researcher was able to select the person at the end of the line, explain the survey and that it would take less time to complete than the time they would be in line, and people were very happy to participate. Once the survey was completed the researcher simply went back to the end of the line and started again. This method resulted in very fast data collection (around 12-14 surveys per hour compared to the average of 6-8 in other stores) with nearly every person asked who was a suitable candidate agreeing to participate.

Overall the touch-screen computers proved to be an easy and successful way of delivering the survey. However there was one problem experienced with the collected data, which centres around a function of the tool (the touch-screen computers) used to deliver the survey. Unfortunately for one group of four attitudinal questions presented on the same screen there was a no response count of between 75 and 80 per question. To put this in context, no

response counts for the other attitudinal questions were less than 15. It was decided that respondents must be given the option of not answering a question if they did not want to and o allow this a NEXT button was included at the bottom of each screen. If the respondent answered all the questions the computer automatically jumped to the next screen and the NEXT button only needed to be pressed if the respondent chose not to answer one or more of the questions. Unfortunately it seems that quite a few respondents would complete the questions on one screen, the computer would jump to the next screen and the respondent would then press the NEXT button without noticing that the screen had changed. This resulted in that respondent missing those four questions.

The potential for this situation to occur was considered by the researcher, and the screen colour was varied between two shades of green on alternating screens to try to prevent this problem. In hindsight the variation between the screens could have been more pronounced. Another potential remedy to this situation would have been if the NEXT button were to be de-activated for 5 seconds after each screen change, so the respondent was forced to look at each screen for 5 seconds before they had the possibility of skipping the question greatly reducing the chance of questions being skipped by accident. Diligence by the person administering the survey to properly explain how the survey operated, familiarity with the survey and awareness by the administrator of the survey to the potential problem was how this issue was dealt with after the researcher became aware of the problem.

The end result of this problem was a reduction in the usable sample size, particularly in respondents from the Moore Wilson and Opawa Organics stores. Opawa Organics is a dedicated organic food store and Moore Wilson is a higher end, fresh food store and hence these stores may have potentially provided consumers more favourable to an organic lamb product. While this loss of data was unfortunate it did not drop the total usable sample below a level that compromised the statistical integrity of the analysis.

4.7   Chapter Summary

Despite one problem regarding missed questions (see section 6.6), the use of the touch screen computers to deliver the survey was very successful. Many respondents commented that it was far easier to complete than a paper and pen type survey. The attractive visual display

allowed interesting and topical pictures to be added into the survey, helping to make it interesting for the respondent. This also allowed pictures of colour and marbling to be presented so respondents could quickly connect with these concepts in a similar way that they would appraise meat in a store. It was also a lot easier to recruit participants with the touch screen computer. The research was asking people to take 5 minutes out of a busy part of their day to complete a survey with no reward prize offered. Having the novelty, visual appeal and ease of use of the touch screen greatly assisted in attracting people to complete the survey. At one point the researcher had three people lining up to take part. The choice modelling section of the survey was delivered very successfully using the touch screen format. The choice options were clearly presented and respondents had little trouble understanding the task at hand and making their selection. A great success of the touch screens was the three formats the computers came in and the ability of the machines to spark curiosity in the project. It is the opinion of the researcher that using touch screen computers for in-store consumer research is a very good method of data collection.

Overall the data collection was successful with a good total number of responses and a very even split between the three versions of the survey and response numbers in Christchurch and Wellington (see the results section for survey numbers).

Chapter Five – Data Analysis and Results

5.1   Data Analysis Techniques

Several techniques were used to analyse the data collected by the survey. The first step was to code the data using Microsoft Excel so it was in a suitable format read into the two main statistical packages used (SPSS and Nlogit). Basic descriptive statistics about the sample collected were pulled out of the data and are given in 5.2. Crosstabs were then run on the attitudinal, consumption and demographic questions as a first step in trying to understand if or how these questions might relate to each other. The most important of these are given in 5.3. The full set of crosstab relationships can in Appendix C. Unfortunately when entered into the choice model did not provide a good indication of how attitudes affect willingness to pay (WTP) for organic lamb. A more advanced method of looking at the attitudes was required, and so factor analysis was undertaken on the attitudinal questions (section 5.5) to see if there are any key themes or underlying constructs that could be inferred from the attitudinal question information. SPSS 2-step cluster analysis was then performed on the newly created factors and the demographic information to construct consumer profiles (section 5.6). Finally, choice models were run using Nlogit version 3 to obtain WTP measures for the attributes of lamb that this survey tested (section 5.7).

5.2   Sample Descriptive Statistics

Basic Survey Collection Statistics

The following table gives an overview of survey counts by store location, survey version, city and total survey number.

Table 4: Survey location counts

Survey Count		441
City	Wellington	220
	Christchurch	221
Survey Version	Version A	149
	Version B	149
	Version C	143
Store location	Moore Wilson	59
	New World Metro	56
	Commonsense Organics	47
	New World Thorndon	58
	New World South City	56
	New World St Martins	55
	From Opawa Organics	35
	Bush Inn Centre	54
	Merivale Mall	21

As demonstrated by this table there is a good balance between surveys collected in Christchurch and Wellington as well as an even split between the three versions of the survey. The individual store results are good, with the exception of Merivale Mall for reasons previously described. It would also have been preferable to have had higher counts at the two specialist organic stores. The lower counts at these stores make comparisons between results from organic stores and general supermarkets less statistically robust. Overall, the data collection process using the methods described was successful and has resulted in a large and useful data set.

Demographic Information

The following tables describe the data set in terms of the demographic characteristics of the respondents in the data set. The first table shows the counts for gender in the survey sample, followed by a percentage comparison between the survey data and the total New Zealand population taken from the 2006 census (www.stats.govt.nz).

Table 5: Respondent gender

Gender	Male	153
	Female	286
	No Response	2

Table 6: Gender for sample and national population

Gender	Survey	NZ Population
Male	34.9%	48.8%
Female	65.1%	51.2%

Sample different from NZ population (Chistat = 33.93, df = 1, Prob = 0.00%)

Despite the sample capturing more women than men at number that makes the sample significantly different from the national population, this result is in line with expectations and previous literature suggesting that it is women who do the majority of household shopping. Such a result helps to validate the data set in that it is performing in accordance with generally expected results and, based on previous literature, is a fair representation of grocery shoppers.

Table 7: Respondent age

Age	<20 years	13
	20-29 years	71
	30-39 years	83
	40-49 years	90
	50-59 years	83
	60-69 years	62
	>70 years	33
	No Response	6

This table shows the ages of the respondents. To check if the age ranges collected in the survey are representative of the general population these age range percentages were

compared to data from the 2006 census (www.stats.govt.nz). The percentage comparison is presented below

Table 8: Age for sample and national population

Age	Survey	NZ Population
18-19	2.9%	4.0%
20-29	16.1%	17.2%
30-39	18.8%	19.4%
40-49	20.4%	20.4%
50-59	18.8%	16.3%
60-69	14.1%	11.0%
>70	7.5%	11.6%

Sample different from NZ population (Chistat = 13.07, df = 6, Prob = 4.20%)

Although the table above shows a similar pattern to the data from the 2006 New Zealand census figures, chi statistics indicate that the sample figures and the census figures are different.

The marital status of the respondents is given in the table below.

Table 9: Respondents family status

Family Status	Single	109
	Partner/Defacto	91
	Married	216
	Widow/widower	21
	No response	4

This is compared to the same data from the 2006 census in the following table.

Table 10: Family status for sample and national population

Marital Status	Survey	NZ Population
Single	24.7%	31.5%
Partner/Defacto	20.6%	13.5%
Married	49.0%	43.7%
Widow/Widower	4.8%	4.7%

Sample different from NZ population (Chistat = 26.72, df = 1, Prob = 0.00%)

This result shows similar patterns between the survey data and census figures. Each category keeps the same order in both data sets when comparing highest to lowest percentages. In this survey there are more people in the 'partner/defacto' category and less in the 'single' category compared to the national census this could be related to how 'partner' is defined. In the census to have this status required living together where as in this survey it was left to the individual to decide what relationship category they were. The chi statistic result shows that the survey data is not representative of the general population with regard to family or marital status.

As discussed in the literature review section the incidence of children in the household can be a driver for increasing demand for organic food. The counts for the number of children currently living in the respondents' household are as follows.

Table 11: Number of children in household

Number of	0	274
Children in	1	55
Household	2	65
	3	37
	4	3
	5	3
	6+	2
	No response	2

For the purposes of data analysis in order to have a sufficient number of responses in each group it was decided to amalgamate this data into those with children and those without children.

Table 12: Children in household

Children in	Yes	165
Household	No	274

Comparing these numbers with data from the 2006 census as percentages gives the following results.

Table 13: Children in household for survey and national population

Children in Household	Survey	NZ Population
Yes	37.6%	51.8%
No	62.4%	48.2%

Sample different from NZ population (Chistat = 35.07, df = 1, Prob = 0.00%)

This shows households without children are under-represented in this survey. A possible reason for this could be the over representation of respondents in the 60-69 year age bracket; these people are unlikely to have children still living at home.

The numbers for household income for the sample are as follows. This question was the one that the most people objected to answering.

Table 14: Respondent household income

Household Income	<$20000	45
	$20000-$29999	35
	$30000-$39999	35
	$40000-$49999	29
	$50000-$69999	77
	$70000-$99999	74
	>$100000	117
	No response	29

The researcher had some difficulty comparing this data to census data due to a mistake made when selecting the income brackets. The above brackets are those used by Statistics New Zealand for personal income, however the income brackets used for household income are different. After discussing this problem with Statistics New Zealand useable figures were found to enable comparison that only required the amalgamation of the $30000-39999 and $40000-49999 brackets. A household income comparison between the survey data and 2006 census data is as follows.

Table 15: Household income for survey and national population

Household Income	Survey	NZ Population
<$20000	10.9%	16.5%
$20000-$29999	8.5%	12.8%
$30000-$49999	15.5%	19.6%
$50000-$69999	18.7%	16.2%
$70000-$99999	18.0%	15.6%
>$100000	28.4%	19.3%

Sample different from NZ population (Chistat = 37.63, df = 5, Prob = 0.00%)

The above table shows a strong lean towards the higher income brackets in the survey data compared to the general population. This is not unexpected, because inclusion in the survey requires that the respondent must already consume some organic food. Prior research has stated that generally organic food consumers are from the upper income brackets, which makes intuitive sense given that organic food sells for an often substantial premium over conventional food. As reported above the survey has a higher percentage of participants who describe their relationship status as 'partnered' or 'married' than the general population which would also have a positive impact on household income. The most probable explanation for the high income levels in the survey is due to the high incidence of people with a university degree in the sample survey. This table is presented below.

Table 16: Respondent education level

Education Level	No formal education	30
	Secondary school	88
	Trade qualification	35
	Polytech qualification	50
	Bachelors degree	153
	Post-graduate degree	79
	No response	6

To make the statistical analysis stronger and to enable this data to be compared to census data (which gives qualification by level from 1-7 up to undergraduate degree level, not by the categories used in the table above) the education level data was amalgamated into those with a university degree and those without. These totals are as follows;

Table 17: Degree or no degree

Education Level	No university degree	203
	University degree	232

Comparing this data to education level data from the 2006 census gives the following table;

Table 18: Education level for sample and national population

Education Level	Survey	NZ Population
No university degree	46.7%	84.2%
University degree	53.3%	15.8%

Sample different from NZ population (Chistat = 457.65, df = 1, Prob = 0.00%)

It is important to note here that the census data includes people aged 15 years and older while the survey data is restricted to those 18 years and older. This is the same for all the comparisons made between the survey data and data from the 2006 census. That being said, the percentage of those in the survey with a university education is very large compared to the national population. This may be partly to do with surveying in Wellington, which has the highest percentage of the population with a university degree (www.stats.govt.nz), however this does not fully explain the very large difference in education level between the survey sample and the overall population. A partial explanation could relate to the higher income

levels in the sample with people who have higher education earning more money and so being able to afford organic food.

As discussed in the literature review it is expected that the sample would capture more women than men due to women doing the majority of shopping for the household (Gracia & Albisu, 2001). Due to the survey being collected in Christchurch and Wellington, two major metropolitan areas in New Zealand it would be expected that income level and education levels would be higher in these locations. According to Statistics New Zealand, Wellington has the highest concentration of people with degree qualifications in the country (www.stats.govt.nz), therefore the differences in income and education level are in many ways as expected. The results for marital status and incidence of children in the household cannot easily be explained. It is interesting to note the directions of the differences, in the survey sample there are more respondents who listed themselves as partner/defacto or married than in the national population, however despite this the incidence of children in the household is lower than the national population.

5.3   Attitudes Towards Organic Food and Production Methods

This section looks at the results of the twelve attitudinal questions in the survey. These questions were designed to test attitudes of New Zealand consumers towards organic food and production methods and to enable comparisons with attitudinal data collected from the European studies cited in the literature review section. Each question was presented as a statement about organic food or other matters such as concern for the environment. The respondents were asked to state their level of agreement with the question on a five point Likert scale with the points strongly agree, agree, neither agree nor disagree, disagree and strongly disagree. Due to low cell counts in some questions, the categories were then collapsed into agree, neither agree nor disagree and disagree for the purposes of analysis the results of which are presented below (see also appendix B for a full breakdown of attitudinal question response numbers).

Table 19: Attitudinal question responses

Question	Agree	Neither Agree nor Disagree	Disagree
Q1 Organic food tastes better than conventionally produced food	62%	33%	5%
Q2 Organic food does not look as good as conventionally produced food	33%	34%	32%
Q3 Organic food is better for me than conventional food because it does not contain any chemical residues	84%	11%	32%
Q4 Organic food is too expensive	66%	21%	13%
Q5 I do not trust organic labelling	17%	36%	47%
Q6 I am concerned about the impact I have on the environment	86%	10%	4%
Q7 What I eat has a big impact on my health	97%	2%	1%
Q8 Organic farming methods are better for the environment than conventional methods	81%	17%	2%
Q9 Organically farmed animals do not suffer from disease such as foot and mouth or BSE ('mad cow')	28%	51%	21%
Q10 Organic food is too hard to find in the places I usually shop	41%	23%	37%
Q11 How animals are treated is an important factor in my food choices	74%	19%	7%
Q12 Organic foods are safer than foods which have been genetically modified	69%	22%	9%

These questions can be looked at in three groups. Questions 1,3,8,9 & 12 are positive statements about or possible reasons to purchase organic food. Questions 2,4,5 & 10 are negative statements about or potential barriers towards the purchase of organic food. Questions 6,7 & 11 are statements about attitudes towards the environment, animal welfare and personal health.

Crosstabs were run using SPSS v15 on the attitudinal questions as well as the demographic and consumption frequency information. A full list of the crosstab results that showed significant relationships are given in appendix C. Due to more advanced methods of looking at the attitudinal questions (factor analysis, section 5.5) and consumer segmentation (cluster analysis, section 5.6) taking place the crosstab results will only be discussed briefly using the attitudes towards the environment, animal welfare and personal health as reference points.

The statement regarding the concern about the impact one has on the environment was agreed with by the majority of respondents with 86% of respondent agreeing or strongly agreeing. Looking at crosstab results for how the concern for the environment relates to other questions in the survey presents us with a profile of the respondents who expressed agreement or strong agreement with the concern for the environment statement. These respondents are more likely to be female, be regular consumers of organic food and to shop at specialist organic stores. They think that organic food tastes better than conventional food and that organic farming methods are better for the environment. They state that the treatment of animals is an important factor in their food choices and also that they consider organic foods to be safer for them than food which has been genetically modified.   It is interesting to note that concern for the environment has a positive relationship with four out of the five positive statements about organic food but with none of the negative statements. This indicates that stated concern for the environment may be a good indicator of support for, or likeliness to purchase organic food.

The second statement to be considered is participants' responses to the 'What I eat has a big impact on my health' statement. There was very strong general agreement with this idea, with 97.6% of all respondents either agreeing or strongly agreeing with this statement. Due to this very high general level of agreement crosstab results only revealed one significant relationship. This was that those who believed that what they eat has a big impact on their health were also more likely to think that organic food tastes better than conventional food.

The third statement deals with concern for animal welfare. This statement is particularly pertinent to this study into organic lamb. Again the majority (74%) of respondents agreed or strongly agreed with this statement. This statement had significant crosstab results with a good number of the other questions and statements. Those respondents who stated that the treatment of animals is an important factor in their food choices are more likely to be female,

aged over 30, married, shop at organic stores and be regular consumers of organic food. They also think that organic food tastes better than conventional food, believe that organic food is better for them than conventional food due to the lack of chemical residues in organic food, are concerned about the impact they have on the environment and think that organic farming methods are better for the environment than conventional methods. They also think that organically farmed animals are less likely to suffer from major diseases such as foot and mouth or BSE ('mad cow'). Finally, they think organic foods are safer than foods which have been genetically modified. This means that concern for animal welfare is positively related to all five of the positive statements about organic food.

The above comparisons show that respondents in the survey who are concerned about health animal welfare and the environment are likely to view organic food and production methods more favourably.

5.4   Summary of Initial Consumer Profiles

Based on the results presented above consumers in the study are likely to:

- Be female
- Be married or living with a partner
- Not to have children in the household
- Have a household income over $50,000
- Have a university degree
- Think that organic food tastes better than conventional
- Think that organic food is better for them than conventional food due to lack of chemical residues
- Think that organic food is too expensive
- Trust organic food labelling
- Be concerned about the impact they have on the environment
- Think that what they eat has a big impact on their health
- Think that organic farming methods are better for the environment
- Have some difficulty in finding organic food in the places they usually shop

- Think that the way animals are treated is very important when deciding what food to purchase

- Think that organic food is safer for them than food which has been genetically modified

It is also of particular use to attempt to build a consumer profile of respondents who state they are regular consumers of organic food (at least once daily consumption). Based on the results presented so far the profile of regular consumers of organic food in this survey is as follows.

- Female
- Aged 40-69
- Shop at specialty organic store
- Think organic food tastes better
- Think organic food is better for them due to lack of chemical residues
- Are concerned about the impact they have on the environment
- Think organic farming methods are better for the environment
- Think organic farmed animals are less likely to suffer from major diseases
- State that how animals are treated is an important factor in food choice
- Think organic food is safer than food which has been genetically modified

5.5   Factor Analysis

Initially it was hoped that the key attitudes identified in crosstab results could be entered into the choice models to provide information about which attitudes are important indicators of WTP for organic lamb. Unfortunately, these initial choice models could not separate consumers into groups according to their responses to the attitudinal questions. This may indicate that the consumers surveyed are a homogenous group and all think fairly similarly about the issues presented. Consumer X may be no more likely to display a willingness to pay for organic lamb than consumer Y based on their attitudes towards the 12 organic food questions. However this result is not conclusive to be able to claim that the sampled consumers are indeed a homogenous group. This meant a more advanced technique for analysing the attitudinal questions and creating consumer profiles was needed. Factor analysis was performed on the attitudinal questions to see if any underlying constructs would

emerge from the attitudinal questions. Following the factor analysis, cluster analysis was performed using the newly created attitudinal factors and the consumer demographic and consumption frequency data, in order to see if separate consumer segments could be identified. If distinct groups do emerge from these processes then these groups can be entered into the choice model to see if different WTP measures are found for each consumer group.

The following steps were undertaken to form the factors.

To prepare the data set for factor analysis the 1=strongly agree to 5=strongly disagree coding system had to be reversed for the four questions (Q8, 10, 11, 16) that were negatively framed about organic food. This re-coded data set now means that 1=strong support for organic food (also environmental, health issues) and 5=strong against.

The next step was to ensure that the data set is indeed suitable for factor analysis. According to Hair et al. (1995) it is important to assess the significance of the correlation matrix and to measure the sampling adequacy. Hair et al. (1995) suggest that a measure of sampling adequacy of at least 0.50 is needed and a Bartlett's Test of Sphericity significant to at least 0.05 is required. The table below presents the results for this data set for the suggested tests and shows a sampling adequacy score of 0.821 and a Bartlett's test of significance at 0.0001. Thus according to the criteria Hair et al. (1995) set down to test a data set's suitability for factor analysis this is a good data set on which to perform factor analysis.

Table 20: Factor Analysis - KMO and Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.821
Bartlett's Test of Sphericity	Approx. Chi-Square	790.175
	df	66
	Sig.	.000

Factor analysis was performed on the 12 attitudinal questions in order to determine if these questions would collapse into factors that could then be placed into a cluster analysis. The factor analysis method was principal components analysis with Direct Oblimin rotation. Principle components extraction is the default setting in SPSSv15 and is the method used

here. As discussed earlier, principal components is an appropriate extraction method for most data sets; it was used here to satisfactory effect. The goal of principle components factor analysis is to see if a large number of variables (the 12 attitudes tested) can be described by a linear function of a smaller number of variables (Isley, 1974). It was necessary to try a rotation technique as without it variable Q16 loaded onto two factors. Given the presence of correlation between factors, Manly (2005) and Mol (1976) suggest an oblique rotation should be used over an orthogonal method. For this study Direct Oblimin rotation was used and gave a satisfactory result with three independent factors extracted. To check this result another oblique rotation was tried (Promax) and the results remained stable.

Table 21: Factor Analysis - Component correlation matrix

Component	1	2	3
1	1.000	.101	.129
2	.101	1.000	.077
3	.129	.077	1.000

Extraction Method: Principal Component Analysis.

 Rotation Method: Oblimin with Kaiser Normalization.

The method described above delivered three factors as displayed in the table below

Table 22: Factor Analysis - Pattern matrix

	Component		
	1	2	3
Q18. Organic foods are safer than foods which have been genetically modified	.737		
Q7. Organic food tastes better than conventionally produced food	.719		
Q14. Organic farming methods are better for the environment than conventional methods	.712		
Q9. Organic food is better for me because it does not contain any chemical residues	.698		
Q15. Organically farmed animals do not suffer from diseases such as foot and mouth or BSE (mad cow)	.646		
Q17. How animals are treated is an important factor in my food choices	.602		
Q12. I am concerned about the impact I have on the environment	.546		
Q8. Organic food does not look as good as conventionally produced food		.771	
Q11. I do not trust organic labelling		.658	
Q10. Organic food is too expensive		.499	
Q16. Organic food is too hard to find in the places I usually shop			.751
Q13. What I eat has a big impact on my health.			.656

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

Rotation converged in 6 iterations.

Factor one is a combination of seven questions. The questions that load onto this factor are made up of the five questions about organic food that suggest benefits of organic food followed by two statements about concern for animal welfare and concern for the environment (see table below). Based on reviewed literature it was expected that the variables dealing with positive feelings about organic food would be represented in the same factor as variables dealing with concern for the environment and for animal welfare, which is

what was found in this case. These attitudes are linked by their intangible nature. They deal with future payoffs or hoped for outcomes that cannot be fully quantified at the point of purchase. The belief is that consumption of and farming methods associated with organic food will have some potential future payoff, in some cases such as taste, just for the individual but also to society as a whole. With a factor that captures seven attitudes it is quite difficult to satisfactorily reflect all the attitudes under one unifying title. However, despite some attributes being more focused on the individual and some on the wider society, the unifying link between all these points is they are intangible at the point of purchase. From now on factor one will be known as 'intangibles at point of purchase'.

Factor two is a combination of three of the four questions that refer to negative feelings about, or problems with, organic food. The attitudes that organic food does not look as good, is too expensive and that organic labelling cannot be trusted loaded onto this factor. This factor describes the problems or frustrations consumers have with the organic food they see presented to them in stores for their consumption. Unlike the 'intangible at point of purchase' factor this factor deals not with what might be in the future but with what is actually presented to the consumer in the store and the consumers perception of that product offering. From here on, factor two will be known as 'actual perceptions at point of sale'.

Factor three captures the 'organic food is too hard to find' attitude and the 'what I eat has a big impact on my health' attitude. The link here is that this factor deals with consumer attitudes at the planning-to-consume stage. Consumers believe that the way they behave i.e. their food consumption patterns, affects their health so they plan to eat healthy. This factor also captures the shopping behaviour that consumers believe organic food is too difficult to locate. The implication of this is they may want to consume organic food but the lack of availability of the product means they discount organic food as a viable option. This factor deals with the effort required by individuals to consume organic food and the impact of food consumption on their health. Factor three will therefore be known as 'personal effort and impact'.

Factor analysis has therefore revealed the following three factors to be carried forward to the cluster analysis.

Table 23: Factor names with attitudes

Factor 1 – Intangible at point of purchase	Factor 2 – Actual perception at point of sale	Factor 3 – Personal effort and impact
Q18. Organic foods are safer than foods which have been GM	Q8. Organic food does not look as good as conventionally produced food	Q16. Organic food is too hard to find in the places I usually shop
Q7. Organic food tastes better than conventionally produced food	Q11. I do not trust organic labelling	Q13. What I eat has a big impact on my health.
Q14. Organic farming methods are better for the environment than conventional methods	Q10. Organic food is too expensive	
Q9. Organic food is better for me because it does not contain any chemical residues		
Q15. Organically farmed animals do not suffer from diseases such as foot and mouth or BSE (mad cow)		
Q17. How animals are treated is an important factor in my food choices		
Q12. I am concerned about the impact I have on the environment		

5.6   Cluster Analysis

With the attitudinal questions condensed into factors as described in the previous section the researcher was able to place these factors along with the consumption and demographic information collected in the survey into a cluster analysis process to investigate if there are different consumer groups within the data set. The results of this are detailed below.

As the researcher is using both continuous and categorical variables in constructing consumer profiles, the cluster analysis for this project was done using SPSS two-step method (see chapter 33 of the SPSS base 15 user guide (2007) for detailed discussion on this method). Put simply this method works by forming pre-clusters to reduce the size of the matrix before using hierarchical clustering to come to a final solution. This method was chosen as it allows both categorical and continuous data to be clustered in one analysis even for very large data files (SPSS 2007, chap 16, pg 380). The continuous data are the three factors identified through factor analysis and the categorical variables are consumption frequency, gender, age, marital status, number of children in household, household income and education level. Although in their pure form some of these variables are continuous (for example, age), they were blocked into categories in this study's survey. The results of the cluster analysis are presented below.

Allowing SPSS to determine the optimum number of clusters led to three clusters being formed with 98 respondents in cluster 1, 131 in cluster 2 and 90 in cluster 30. Unfortunately there are 122 excluded cases which have resulted in the most part from the data collection issues as discussed previously.

Table 24: Cluster Analysis - Cluster distribution

		N	% of Combined	% of Total
Cluster	1	98	30.7%	22.2%
	2	131	41.1%	29.7%
	3	90	28.2%	20.4%
	Combined	319	100.0%	72.3%
Excluded Cases		122		27.7%
Total		441		100.0%

Table 25: Cluster Analysis - Centroids

		BART factor score 1 for analysis 2		BART factor score 2 for analysis 2		BART factor score 3 for analysis 2	
Cluster		Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
	1	-.321	.949	-.0476	1.098	-.285	1.047
	2	-.00504	.939	.232	.881	.0772	.948
	3	.328	1.045	-.326	.990	.205	.990
	Combined	-.00815	1.002	-.0114	1.006	.00200	1.008

The next three charts graphically present the importance of each factor in the creation of the clusters. Due to the coding method used, a negative score indicates agreement with that factor while a positive score indicates disagreement with the ideas captured in that particular factor. A score around zero indicates neutrality on these issues.

Table 26: Cluster Analysis - Cluster one, factors

TwoStep Cluster Number = 1
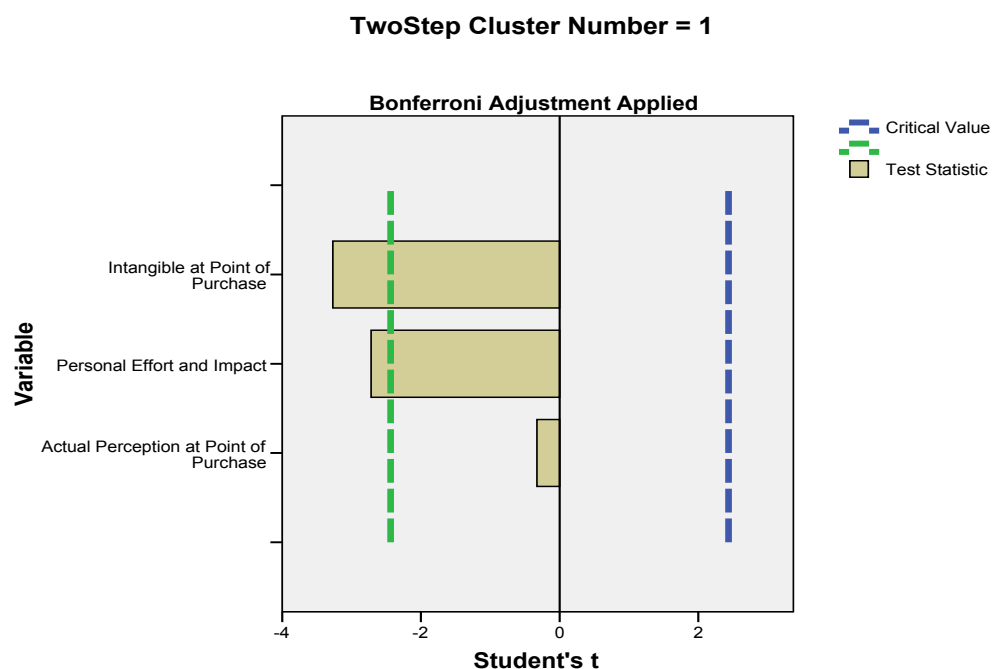
The above graph shows that the respondents that fall into cluster one demonstrate positive feelings or agreement about the 'intangible at point of purchase' factor. This factor is the most important of the three in explaining the attitudes of cluster one members. The 'personal impact and effort' factor is also significant to the make-up of cluster one as this result is also past the critical value line. The 'actual perception at point of purchase' factor is not an important group of attitudes for this cluster.

Table 27: Cluster Analysis – Cluster two, factors

TwoStep Cluster Number = 2
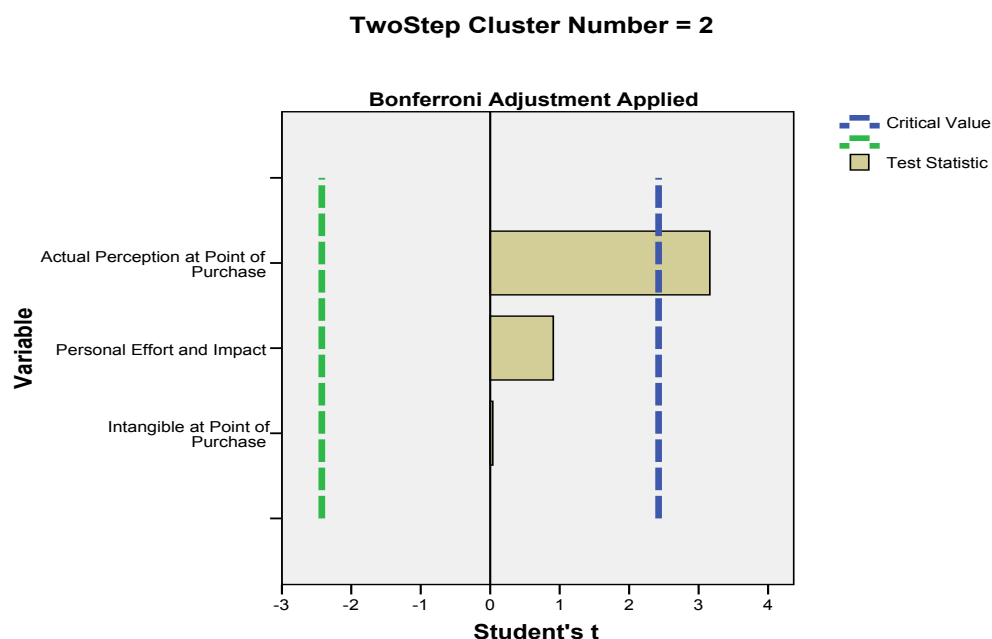
The above graph shows the importance of the factors in the make-up of cluster two. For cluster two consumers the only significant factor to group membership is disagreement with the questions that are captured in the 'actual perception at point of purchase' factor. These questions were common barriers to purchase so this result suggests that consumers in this cluster do not see those things as barriers to their organic food purchase. Neither of the other two factors are significant to cluster two membership.

Table 28: Cluster Analysis - Cluster 3, factors

TwoStep Cluster Number = 3
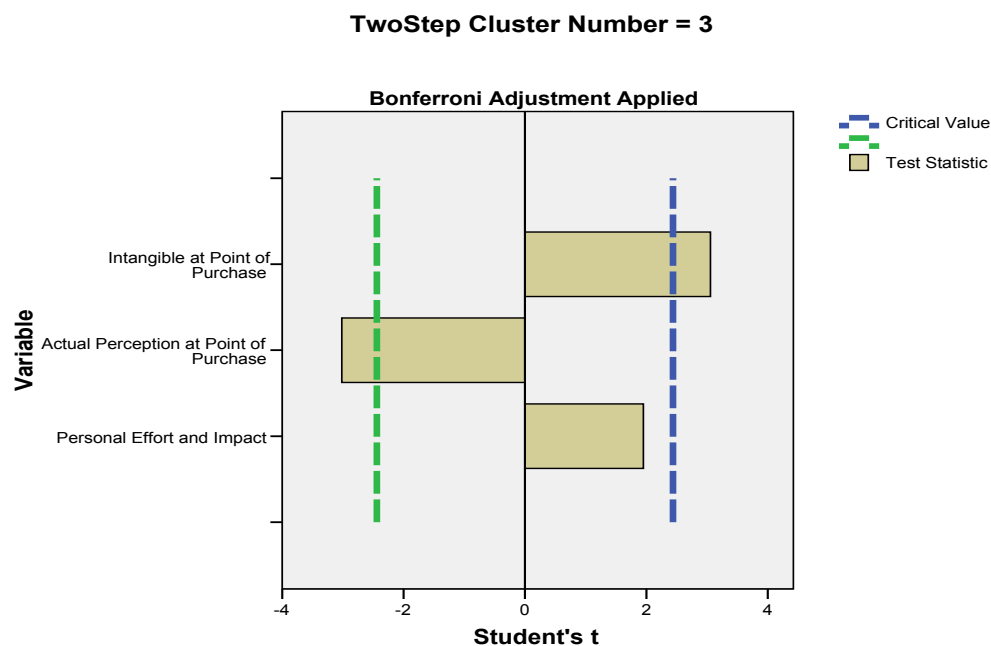
The above graph shows the importance of the factors to the make-up of cluster three. Most important to the make-up of this cluster is disagreement about the attitudes captured in the 'intangible at point of purchase' factor. This indicates these consumers do not agree that the intangible benefits are substantial enough to influence the buying event. Cluster three consumers show significant agreement with the 'actual perception at point of purchase' questions which suggests they do see these things as barriers to purchase. Finally, while just inside the critical value line these consumers show disagreement with the attitudes in 'personal effort and impact'.

The table below gives the exact values for each factor for each cluster and is a tabular display of the information contained in previous three charts.

Table 29: Cluster Analysis - Factor scores for cluster membership

TwoStep Cluster Number		BART factor score 1 for analysis 1	BART factor score 2 for analysis 1	BART factor score 3 for analysis 1
1	Mean	-.321	-.0476	-.285
	N	98	98	98
	Std. Deviation	.949	1.098	1.047
2	Mean	-.00504	.232	.0772
	N	131	131	131
	Std. Deviation	.939	.881	.948
3	Mean	.328	-.326	.205
	N	90	90	90
	Std. Deviation	1.045	.990	.990
Total	Mean	-.00815	-.0114	.00200
	N	319	319	319
	Std. Deviation	1.002	1.006	1.008

The next three graphs show the relative importance of each demographic or consumption variable in the construction of each cluster. Variables that measure beyond the critical value line indicate that these variables are significant in the formation of the cluster. The variable that appears first indicates the most important variable in the cluster's construction, the variable that appears second is the second most important and so on.

Table 30: Cluster Analysis - Cluster one demographics

TwoStep Cluster Number = 1
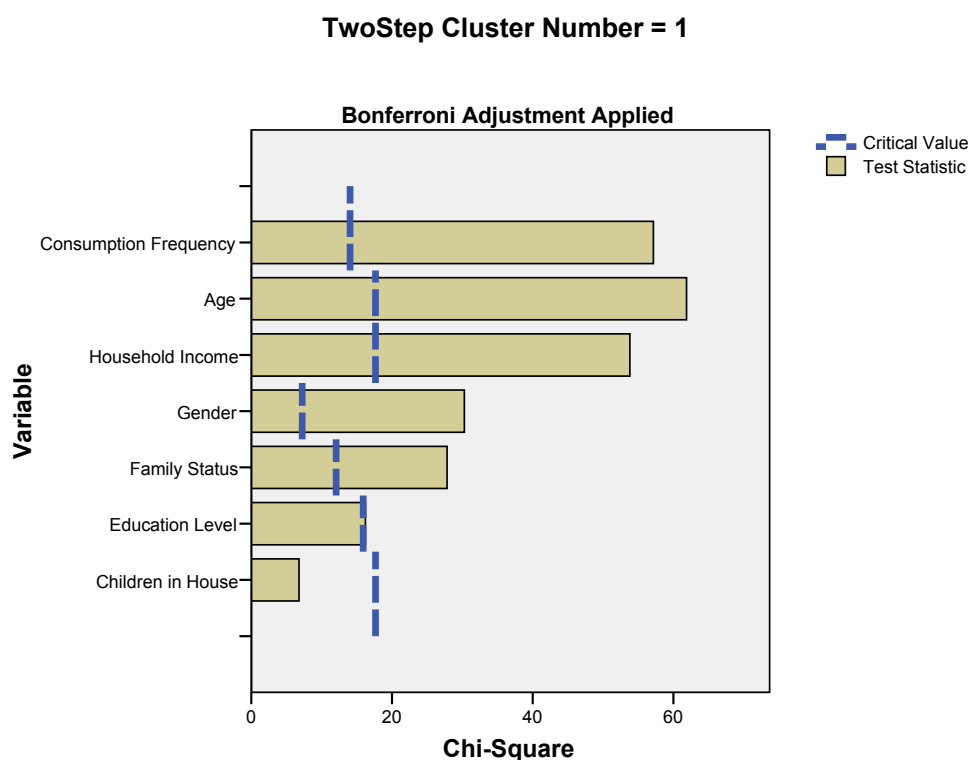
The above graph shows that consumption frequency (these are the daily consumers of organic food) is the most significant demographic/consumption variable to cluster one membership. Age is second most important; these are older consumers mostly aged 50-69. Household income is third, these are middle to high income earners. Gender is important to the make-up of this group, they are predominantly female and finally family or marital status is important with this group being mostly married. Education level and number of children in the household were not significant indicators of membership to cluster one.

Table 31: Cluster Analysis - Cluster two demographics

TwoStep Cluster Number = 2

Bonferroni Adjustment Applied
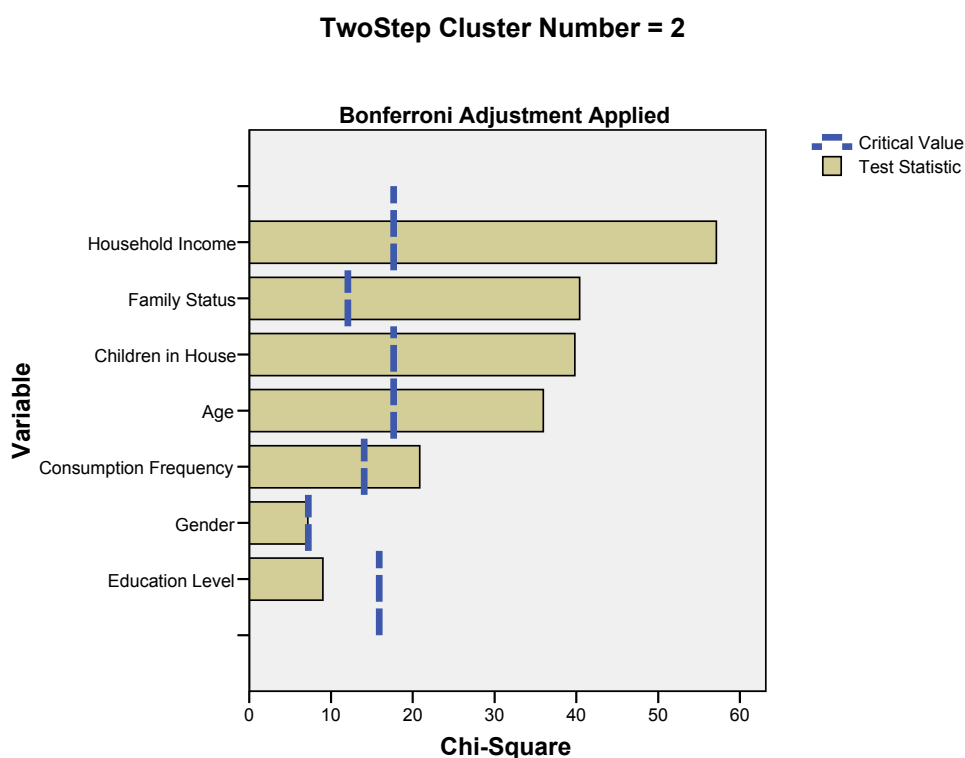
The above graph shows that household income is the most important variable to the make-up of cluster two. These are high income consumers mostly with combined household income of over $100000. Family or marital status is a significant indicator with this group being mostly made up of married couples. Cluster two is where the highest incidence of children in the household is found with most of the respondents with children in the household falling in this cluster. Respondents in this cluster are mostly of middle age from 30-49 years old. The organic food consumption frequency of this group is weekly. Gender and education level are not significant indicators of membership to this cluster

Table 32: Cluster Analysis - Cluster three demographics

TwoStep Cluster Number = 3

Bonferroni Adjustment Applied
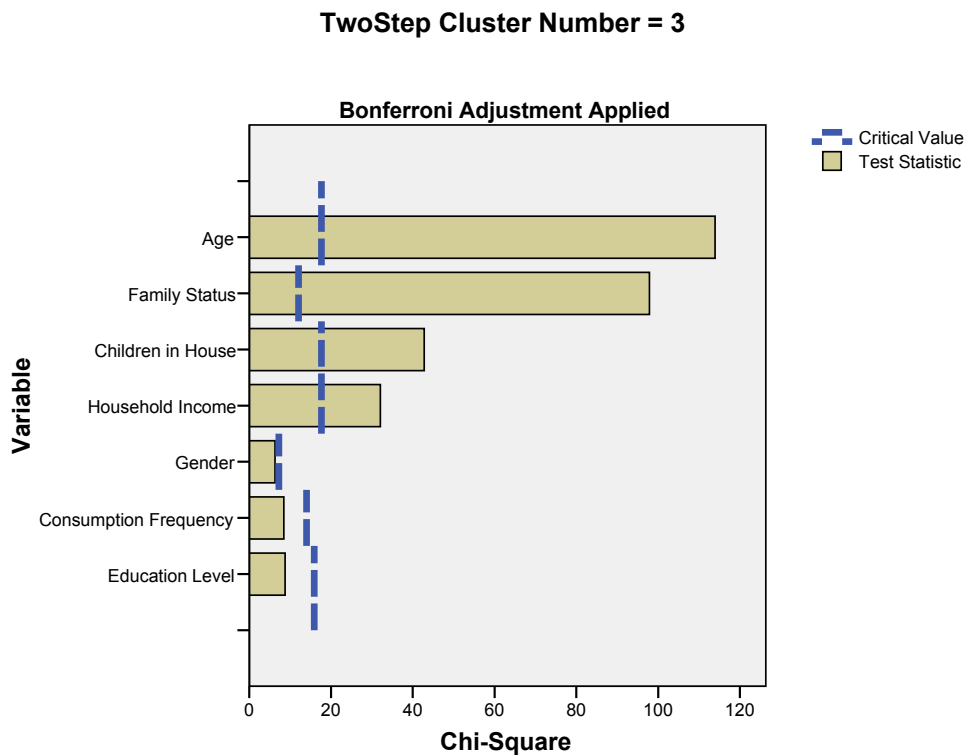
The above graph shows that age is the most important variable in the make-up of cluster three. Respondents in this cluster are younger aged mostly 20-29 years old. The family or marital status of cluster three members is predominantly single with no respondents in this cluster married. The absence of children in the household is a significant indicator of membership to cluster three. Household income is also important to the make-up of this group; this group has quite a large spread with higher counts at both ends of the income scale and less earning middle income. Overall however this group shows higher numbers at the lower two income brackets than either of the other two clusters. For this cluster gender, consumption frequency and education level are not significant indicators of cluster three membership.

This table below gives the number of respondents for each variable captured in each cluster and so provides information as to the types of consumers captured in each cluster.

Table 33: Cluster Analysis - Cluster membership demographics

Question	Value measure	% in Cluster 1	% in Cluster 2	% in Cluster 3
Q5. Frequency of consumption	Daily	61	14	17
	Weekly	13	49	42
	Monthly	26	37	41
	Total	100	100	100
Q27. Gender	Male	11	50	53
	Female	89	50	47
	Total	100	100	100
Q28Age	<20	2	4	3
	20-29	3	5	62
	30-39	9	26	29
	40-49	15	37	2
	50-59	33	16	3
	60-69	27	10	0
	>70	11	2	1
	Total	100	100	100
Q29. Family/Marital status	Single	19	7	64
	Defacto/Partner	13	22	34
	Married	56	70	0
	Widow/Widower	12	1	2
	Total	100	100	100
Q30.Number of children in house	No children	67	39	97
	Children	33	61	3
	Total	100	100	100
Q31. Household income	<20000	4	3	23
	20000-29999	16	0	13

	30000-39999	25	1	6
	40000-49999	7	4	12
	50000-69999	27	11	10
	70000-99999	8	28	18
	100000 +	13	53	18
	Total	100	100	100
Q32. Education level	No degree	51	48	34
	Degree	49	52	66
		100	100	100

5.7   Choice Models

The most important analysis for this study is the creation of the choice models which will enable a WTP measure to be found for each of the tested attributes of lamb. The choice modelling was done using the Nlogit version 3 software package. The following section displays the choice modelling results. The basic model is shown first followed by an attempt to place consumer attitudes into the model that was not successful in adding to the descriptive value of the model. Following that the individual models for the three consumer groups, Committed Organic Seekers, Convenience Organic Consumers and Incidental Organic Consumers are given. A fourth model, Missing Organic Consumers is shown; this model was estimated as the basis for these respondents' exclusion (n=122) was due to missing attitudinal and/or demographic information and not because of any problems with the choice modelling data that was collected.

The Basic Model

The first step was to create a basic model which captured the attributes in the choice section (price, availability, production method, colour, marbling and branding/certification). To do this an appropriate coding system had to be employed for the data which was as follows. Price was the base for the model and so stayed in its set units from $3.98 to $8.85. For availability, production method and branding/certification each of the three options in each

group was dummy coded, 1 if option chosen, 0 otherwise. For marbling and colour each option was coded 0, 1, 2 for each of the available options with 0 being for slight marbling and red colour and 2 for abundant marbling and brown colour.

A run of this basic model with supermarket as the base for availability, pasture as the base for production method and branded as the base for branding/certification gave the following result.

Table 34: Choice Modelling - Base model

	Coeff.	Std.Err.	t-ratio	P-value		Part-worth
PRICE	-0.167	0.0154	-10.805	2.89E-15		-1
SPECSTR	-0.0322	0.0582	-0.553	0.579		-0.192
FARMMKT	-0.0509	0.0703	-0.724	0.468		-0.304
FEEDLOT	-0.606	0.0690	-8.781	2.89E-15		-3.620
ORGANIC	0.327	0.0657	4.988	6.09E-07		1.957
COLOR	-0.355	0.0287	-12.365	2.89E-15		-2.123
MARBLING	-0.377	0.0296	-12.745	2.89E-15		-2.255
UNBRAND	-0.0571	0.0666	-0.856	0.391		-0.340
CERT	0.411	0.0724	5.677	1.37E-08		2.454

Log-likelihood   -3225.905

AIC   6469.81

BIC   6524.933

The results for the base model are as follows:

- The first result for price indicates that the model is behaving as it should. That is the price co-efficient is negative meaning that as price increases quantity demanded decreases, the P-value shows this result is statistically significant at the 99% confidence interval.
- For the purchase location attribute the co-efficient value for speciality store and farmers market are both negative indicating the base location (supermarket) is preferred, however these values are small and not statistically significant.
- The production method shows large co-efficient values that are very strongly negative (rejection of production method) for feedlot and significant at 99% and are strongly

positive (support for production method) for organic production again significant at 99%.

- The colour and marbling attributes both have quite large co-efficient values of similar size. The negative direction indicates that consumers prefer red coloured meat over brown and slightly marbled (lean) meat over abundantly marbled. Both these results are significant at the 99% confidence level.

- The final attribute is for branding and certification which shows a small, negative co-efficient value for the unbranded product indicating that there is a slight preference for the branded product over the unbranded although this is not statistically significant. The result for certification shows the largest positive co-efficient value for this model which shows that for all the attributes tested the certification of the lamb product is what the respondents considered the most important. This result is significant at 99% confidence.

The part-worth values are calculated as a ratio of two parameter estimates; as long as one of the parameters is measured in dollars (or other currency of the researchers choosing) the result will give a willingness to pay measure for the other attribute (Hensher et al., 2005) pg 358). By reversing the sign of the co-efficient value for the attribute in question then dividing it by the price co-efficient (which is always negative) a part-worth measure will be given for that attribute.

Looking at the part-worth values from the base model gives the following willingness to pay measures:

- For the availability of the product overall, respondents in the sample would prefer to purchase from the supermarket which is preferred by $0.19 over buying at a speciality store and $0.30 over a farmers market.

- For the production method, the feedlot production is not accepted with respondents stating they would be prepared to pay an extra $3.62 per serve to obtain meat raised under normal pasture conditions. The organic production method was the most preferred growing method with respondents stating they would be prepared to pay an additional $1.96 per serve for organic lamb over the standard pasture raised product. This means the respondents state a WTP for organic lamb over a feedlot raised lamb of $5.58 per serve.

- For the preferred colour of the lamb meat, the results show that respondents preferred the red colour over the brown colour with a WTP to get the red colour of $2.12.

- As far as the amount of marbling in the meat that is preferred, the model shows that slight (the lowest level) marbling is preferred by $2.26 per serve over abundant (the highest level) marbling.

- For the branding/certification attribute, the results show that a branded product is favoured over an unbranded product with a WTP of $0.34 to have the lamb branded. Of considerably more interest is that respondents profess a WTP of $2.45 per serve over the branded product if the lamb is branded and has independent certification.

To summarise the findings in the model we can create a profile of how the respondents would like their lamb cutlet to be presented to them in terms of which levels of the attributes attracted the greatest stated WTP. The preferred lamb cutlet is as follows:

- Available at the supermarket

- Organic

- Red in colour

- Slightly marbled

- Branded and certified

Introducing Consumer Attitudes into the Choice Model

The above information while useful, does not tell us anything about how the attitudes of the respondents to organic food issues explain the choices made. This information is important as it would allow marketers to identify which attitudes or beliefs are the important drivers of consumption and so can be promoted and which are barriers and need to be overcome. To enable this to be done the responses to purchase frequency and the attitude questions that deal with the beliefs that organic food tastes better, is better for the environment, better for ones health, better for animal welfare and is safer than genetically modified food were dummy coded and entered into the choice model. These new variables were incorporated into a model that multiplied the organic attribute by respondents' attitudes as presented in CM equation 7.

Model With Consumer Attitudes

Table 35: Choice Modelling - Model with consumer attitudes

	Coeff.	Std.Err.	t-ratio	P-value		Part-worth
PRICE	-0.156	0.0152	-10.256	2.89E-15		-1
SPECSTR	-0.0151	0.0583	-0.260	0.794		-0.0967
FARMMKT	0.0667	0.0658	1.012	0.311		0.425
FEEDLOT	-0.762	0.0613	-12.426	2.89E-15		-4.857
COLOR	-0.371	0.0286	-12.988	2.89E-15		-2.369
MARBLING	-0.381	0.0295	-12.930	2.89E-15		-2.432
UNBRAND	-0.0162	0.0659	-0.246	0.805		-0.103
CERT	0.468	0.0715	6.543	6.01E-11		2.982
ORGFREQ	0.00642	0.00640	1.003	0.315		0.0409
ORGTASTE	0.00367	0.00456	0.805	0.420		0.0234
ORGENV	-0.126	0.108	-1.164	0.244		-0.804
ORGHELTH	0.122	0.108	1.133	0.257		0.783
ORGWELF	0.00307	0.00764	0.402	0.687		0.0196
ORGSAFE	-0.00174	0.007831	-0.222	0.823		-0.0111

Log Likelihood   -3234.07

AIC   6496.134

BIC   6581.88

As this model shows none of the attitudes were significant. Many versions of this model were tried to see if removing some variables would make others more significant. Of these results only 'organic food is better for the environment' came out with a significant result in any of the variations of the model. This does not mean that there is little or no heterogeneity in the attitudes of the respondents but does say that in this form the choice model is not sensitive enough to pick up those possible differences. Thus an alternative approach was needed to attempt to classify consumers which led to the factor and cluster analysis processes being undertaken on the data set.

For this project, cluster analysis provided different consumer groups that could then be entered into the choice model to see if the different consumer groups value the lamb product

attributes differently. If the results show that differences in WTP are identified between the groups, this is useful information as it can help identify the type of consumer likely to be most receptive to the product and enable marketers of organic lamb to target their appeals in a way that is appropriate to the group. If no difference is found between the groups, then this is also a useful finding as it means that the marketing strategy used does not need to be targeted at a specific group of consumers at the exclusion of the others. As discussed earlier the cluster analysis process resulted in three clusters emerging from the data set. These clusters were then dummy coded and entered into the choice model. The results are as follows:

Combined Model with Consumer Clusters

Table 36: Choice Modelling - Combined cluster model

	Coeff.	Std.Err.	t-ratio	P-value		Part-worth
PRICE	-0.168	0.0155	-10.836	2.89E-15		-1
SPECSTR	-0.0333	0.0583	-0.572	0.567		-0.198
FARMMKT	-0.0491	0.0703	-0.698	0.485		-0.292
FEEDLOT	-0.607	0.0690	-8.799	2.89E-15		-3.615
COLOR	-0.355	0.0287	-12.370	2.89E-15		-2.115
MARBLING	-0.377	0.0296	-12.746	2.89E-15		-2.246
UNBRAND	-0.0587	0.0667	-0.880	0.3783		-0.349
CERT	0.408	0.0724	5.643	1.67E-08		2.431
C1ORG	0.529	0.119	4.444	8.82E-06		3.148
C2ORG	0.335	0.102	3.261	0.00110		1.995
C3ORG	0.184	0.120	1.531	0.125		1.097
MISSORG	0.265	0.107	2.473	0.0133		1.577

Log likelihood   -3223.28

AIC   6470.554

BIC   6544.051

The results in the above model show the following WTP values for the organic attribute for each cluster:

- The Committed Organic Seekers (cluster one) display a WTP for the organic lamb cutlet of $3.15 per serve. This result fits with what is expected given the consumer

profile built up at the cluster analysis stage and discussed earlier. Committed Organic Seekers are those who display the highest levels of agreement towards the attitudes that are supportive towards organic food and production methods and so it follows that they would also display the highest WTP for the organic product.

- The results for the Convenience Organic Consumer (cluster two) respondents show a WTP for the organic lamb product of $2.00 per serve.

- The results for the Incidental Organic Consumer (cluster three) respondents show that they have a WTP for the organic product of $1.10 per serve.

- The last result in this table is for those respondents who due to missing values for some of the attitudinal or demographic questions were not assigned to a cluster. This group shows a WTP for organic of $1.58 per serve.

Model Fit

The model fit statistics for each of the above models can be compared to see if adding the consumer groups into the model improved the overall model fit. Two fit statistics are calculated the Akaike information criterion (AIC) and the Bayesian information criterion (BIC) using formulas from Kennedy (2003). If the model with clusters is a better fit than the base model, the model with clusters will have fit statistics closer to zero. This is not the case here where a small increase is seen in the fit statistics between the model with consumer clusters (AIC 6470.6) and the base model (AIC 6469.8). However when looking at the model with consumer attitudes compared to the model with clusters, the model with clusters shows a better fit (Cluster AIC 6470.6 < Attitudes AIC 6496.1) indicating that the cluster model is a better method of adding consumer information into the choice model. This result does not mean that the idea of consumer segmentation should be abandoned as we have already established good grounds for our consumer segmentation options (through the cluster analysis process). While it does not result in a better fitting choice model, the explanatory value of separating consumers by the clusters is the correct course of action to achieve the aims of this study. Unfortunately these statistics can only be compared across models estimated on the same dataset so fit statistics, although calculated and presented for each individual model, cannot be compared for each individual cluster model with the techniques used in this study.

Choice Models by Cluster

The co-efficient and P-values for the combined cluster model results show that statistically significant differences do exist in how the different consumer segments valued the organic attribute. The next step is to split the sample by cluster in order to allow all the tested attributes to be calculated individually for each consumer segment. The sample sizes for each model, although clearly reduced, are still well above the necessary sample size to make the model work (see section 4.6 for required sample size).

Individual Choice Model for Cluster One – Committed Organic Seekers

Table 37: Choice Modelling - Committed Organic Seekers model

	Coeff.	Std.Err.	t-ratio	P-value		Part-worth
PRICE	-0.129	0.0326	-3.969	7.21E-05		-1
SPECSTR	0.176	0.127	1.385	0.166		1.365
FARMMKT	0.343	0.158	2.175	0.0295		2.654
FEEDLOT	-0.873	0.155	-5.618	1.93E-08		-6.743
ORGANIC	0.351	0.142	2.469	0.0135		2.709
COLOR	-0.475	0.0641	-7.408	1.28E-13		-3.668
MARBLING	-0.436	0.0666	-6.541	6.07E-11		-3.366
UNBRAND	-0.169	0.146	-1.154	0.248		-1.307
CERT	0.418	0.157	2.651	0.00800		3.228

Log likelihood   -679.316

AIC   1376.632

BIC   1418.043

The results for the Committed Organic Seekers model are as follows:

- For purchase location attribute the co-efficient value for speciality store and farmers market are both positive indicating that both these options are preferred to the supermarket. The value for speciality store is not significant however the larger co-efficient value for purchase at a farmers market is significant at the 95% level.

- The production method attribute shows a very large, negative co-efficient value for feedlot production and a large, positive value for organic production. The size of these

values indicates that organic production is much preferred to pasture raised but also that the rejection of feedlot production compared to pasture raised is over twice as strong as the support for organic production over pasture raised. This indicates these consumers are extremely unwilling to purchase feedlot raised lamb, these results are significant at 99%.

- The colour and marbling attributes both have large co-efficient values of similar size. The negative direction indicates that consumers prefer red coloured meat over brown and slightly marbled (lean) meat over abundantly marbled. Both these results are significant at the 99% confidence level.

- The final attribute is for branding and certification which shows a reasonably small, negative co-efficient value for the unbranded product indicating that there is a slight preference for the branded product over the unbranded although this is not statistically significant. The result for certification shows a strong positive co-efficient value significant at the 99% confidence interval.

The implied part-worth values that can be calculated from the above information are as follows:

- Of particular interest here is that this group of consumers display an aversion for purchasing their organic lamb at a supermarket. The most preferred location to purchase organic lamb for this group is at a farmers market with a WTP of $2.65 per serve. This means that these consumers are willing or even prefer to go to the effort of making a special trip to obtain an organic lamb product.

- As expected this group shows a strong WTP for the lamb having an organic production method of $2.71 per serve. The previously mentioned strong negative result for feedlot production gives a negative WTP of $6.74 per serve which basically means that there are almost no circumstances under which this group of consumers would purchase feedlot raised lamb.

- Committed Organic Seekers are very clear that they want their lamb to have little or no marbling, WTP $3.37 over an abundantly marbled product and to be red in colour, WTP $3.67 over a brown colour.

- They are also very keen to have the lamb certified. The unbranded product attracts a negative WTP of $1.30 per serve compared to a branded product. If the lamb is

certified then this group have a WTP for certification of $3.23 per serve over the branded product.

Individual Choice Model for Cluster Two – Convenience Organic Consumers

Table 38: Choice Modelling - Convenience Organic Consumers model

	Coeff.	Std.Err.	t-ratio	P-value		Part-worth
PRICE	-0.176	0.0287	-6.150	7.71E-10		-1
SPECSTR	-0.0519	0.106	-0.490	0.624		-0.294
FARMMKT	-0.261	0.130	-2.012	0.0441		-1.482
FEEDLOT	-0.658	0.127	-5.164	2.42E-07		-3.730
ORGANIC	0.345	0.121	2.851	0.00435		1.959
COLOR	-0.403	0.0529	-7.626	2.42E-14		-2.287
MARBLING	-0.364	0.0544	-6.702	2.05E-11		-2.065
UNBRAND	-0.00115	0.122	-0.00938	0.992		-0.00649
CERT	0.486	0.134	3.604	0.000313		2.753

Log likelihood   -960.27

AIC   1938.539

BIC   1982.949

The results for the Convenience Organic Consumer model are as follows:

- For the purchase location attribute, the co-efficient value for speciality store is negative but very small in size and not statistically significant. The Convenience Organic Consumer does not want to go to a farmers market to purchase; this co-efficient value is negative and significant at the 95% confidence interval.

- The production method attribute shows a very large, negative co-efficient value for feedlot production and a large, positive value for organic production. The size of these values indicates that organic production is much preferred to pasture raised, but also that the rejection of feedlot production compared to pasture raised is nearly twice as strong as the support for organic production over pasture raised. This indicates these consumers are extremely unwilling to purchase feedlot raised lamb, these results are significant at 99%.

- The colour and marbling attributes both have large co-efficient values of similar size. The negative direction indicates that consumers prefer red coloured meat over brown and slightly marbled (lean) meat over abundantly marbled. Both these results are significant at the 99% confidence level.

- The final attribute is for branding and certification which shows effectively no difference between the co-efficient values for unbranded and the branded product. The result for certification shows a strong positive co-efficient value significant at the 99% confidence interval.

With the exception of the purchase location attribute the values for the Convenience Organic Consumer follow a similar preference pattern to those seen in the Committed Organic Seeker model.

The part-worth values for the Convenience Organic Consumer model give the following results:

- This group of consumers prefer to purchase lamb from the supermarket and would not want to go to a farmers market to make a purchase. The farmers' market option attracted a negative WTP of $1.48 per serve compared to the supermarket option. The speciality store option also attracted a small negative WTP measure of $0.29 per serve.

- The Convenience Organic Consumer shows a preference for organic meat over pasture raised of $1.96 per serve and show a negative WTP for feedlot production of $3.73 per serve.

- They want their meat to be red not brown in colour, WTP $2.29 per serve and slightly marbled over abundant marbling, WTP $2.07 per serve.

- They also want their lamb to be certified showing a WTP of $2.75 per serve over a branded product. Interestingly this consumer group sees no benefit to branding the product without certification with the results showing no WTP difference between a branded and an unbranded lamb product.

Individual Choice Model for Cluster Three – Incidental Organic Consumers

Table 39: Choice Modelling - Incidental Organic Consumers model

	Coeff.	Std.Err.	t-ratio	P-value		Part-worth
PRICE	-0.339	0.0384	-8.831	2.89E-15		-1
SPECSTR	-0.198	0.129	-1.531	0.125		-0.585
FARMMKT	-0.318	0.155	-2.049	0.0403		-0.939
FEEDLOT	-0.307	0.151	-2.024	0.0429		-0.904
ORGANIC	0.395	0.151	2.620	0.00876		1.166
COLOR	-0.324	0.0636	-5.095	3.48E-07		-0.955
MARBLING	-0.397	0.0643	-6.182	6.31E-10		-1.171
UNBRAND	-0.0317	0.149	-0.212	0.831		-0.0934
CERT	0.387	0.161	2.403	0.0162		1.142

Log likelihood   -657.919

AIC   1333.839

BIC   1374.964

The results for the Incidental Organic Consumer model are as follows:

- For the purchase location attribute the co-efficient value for speciality store is negative but just falls outside of the minimum 90% confidence interval for statistical significance. The Incidental Organic Consumer does not want to go to a farmers market to purchase; this co-efficient value is negative and significant at the 95% confidence interval.

- The production method attribute shows a moderate, negative co-efficient value for feedlot production and a moderate, positive value for organic production both results are significant at the 95% confidence level.

- The colour and marbling attributes both have moderate co-efficient values of similar size. The negative direction indicates that these consumers prefer red coloured meat over brown and slightly marbled (lean) meat over abundantly marbled. Both these results are significant at the 99% confidence level.

- The final attribute is for branding and certification which shows almost no difference between the co-efficient values for unbranded and the branded product. The result for

certification shows a positive co-efficient value significant at the 95% confidence interval.

These co-efficient values follow a very similar pattern of preferences to those seen in the Convenience Organic Consumer model.

The implied part-worth calculation for the Incidental Organic Consumer model gives the following results:

- Like the Convenience Organic Consumers this group, the Incidental Organic Consumers, prefer to purchase lamb from the supermarket and would not want to go to a farmers market to make a purchase. The farmers' market option attracted a negative WTP of $0.94 per serve compared to the supermarket option. The speciality store option also attracted a negative WTP measure of $0.59.

- The Incidental Organic Consumer shows a preference for organic meat over pasture raised of $1.16 per serve and are the least put off by feedlot production showing a negative WTP for of $0.91 per serve.

- They want their meat to be red not brown in colour, WTP $0.96 per serve and slightly marbled over abundant marbling, WTP $1.17 per serve.

- They also want their lamb to be certified showing a WTP of $1.14 per serve over a branded product. Like the Convenience Organic Consumer the Incidental Organic Consumer sees no benefit to branding the product without certification with the results showing a negative WTP of just $0.10 for the unbranded lamb product.

Choice Model for Respondents Missing from Cluster Analysis

Table 40: Choice Modelling - Missing consumers model

	Coeff.	Std.Err.	t-ratio	P-value		Part-worth
PRICE	-0.0859	0.0283	-3.026	0.00247		-1
SPECSTR	-0.0629	0.111	-0.564	0.572		-0.732
FARMMKT	0.0505	0.131	0.384	0.700		0.588
FEEDLOT	-0.599	0.128	-4.655	3.23E-06		-6.978
ORGANIC	0.241	0.121	1.980	0.0476		2.806
COLOR	-0.249	0.0536	-4.649	3.32E-06		-2.905
MARBLING	-0.344	0.0560	-6.150	7.74E-10		-4.013
UNBRAND	-0.0613	0.124	-0.491	0.623		-0.714
CERT	0.335	0.135	2.477	0.0132		3.900

Log likelihood   -896.995

AIC   1811.99

BIC   1855.221

The results for the missing consumers' model are as follows:

- For the purchase location attribute the co-efficient value for speciality store is negative and for farmers market is positive, both are however quite small and neither is statistically significant indicating that none of the purchase locations is strongly preferred.

- The production method attribute shows a very large, negative co-efficient value for feedlot production and a large, positive value for organic production. The size of these values indicates that organic production is much preferred to pasture raised but also that the rejection of feedlot production compared to pasture raised is over twice as strong as the support for organic production over pasture raised. This indicates these consumers are extremely unwilling to purchase feedlot raised lamb, the results for feedlot and organic production are significant at the 99% and 95% confidence intervals respectively.

- The colour attribute has a reasonably large, negative co-efficient value that is significant at 99% confidence. The negative direction indicates that consumers prefer red coloured meat over brown. The marbling attribute has a large, negative value which is

statistically significant at 99% confidence. This result shows a strong preference for slightly marbled (lean) meat over abundantly marbled meat.

- The final attribute is for branding and certification which shows a very small, negative co-efficient value for the unbranded product indicating that there is an almost negligible preference for the branded product over the unbranded; this result is not statistically significant. The result for certification shows a very strong, positive co-efficient value significant at the 99% confidence interval.

The part-worth values for the missing consumers' model are as follows:

- For purchase location, the results show a negative WTP for speciality store of $0.73 and a positive WTP for farmers market of $0.59 per serve.

- This group shows a strong WTP for the lamb having an organic production method of $2.81 per serve while displaying a very strong rejection of feedlot production methods with a negative WTP of $6.98 per serve which basically means that there are almost no circumstances under which this group of consumers would purchase feedlot raised lamb.

- These consumers are very clear that they want their lamb to have little or no marbling, WTP $4.01 over an abundantly marbled product and to be red in colour, WTP $2.91 over a brown colour.

- They are also very keen to have the lamb certified. The unbranded product attracts a negative WTP of only $0.71 per serve compared to a branded product. However if the lamb is certified then this group have a WTP for certification over branding of $3.90 per serve.

The following tables summaries the WTP information for each option and each model. Where dummy coding is used, the base measure used will have a $0.00 value and the other options will be either preferred (a positive value) or not preferred (a negative value) vis-à-vis the base attribute level. The colour and marbling attributes are coded 0,1,2 so the WTP values indicate the preference to obtain the preferred option (in both cases the option coded 0) over option coded 1 and how much option coded 1 is preferred over option coded 2, the least preferred option.

Willingness to Pay for Store Location

Table 41: Choice Modelling - WTP for store location

Location	Basic Model	Cluster One Model	Cluster Two Model	Cluster Three Model	Missing Values Model
Supermarket	**$0.00**	$0.00	**$0.00**	**$0.00**	**$0.00**
Speciality Store	-$0.19	$1.37	-$0.29	-$0.59	-$0.73
Farmers Market	-$0.30	**$2.65**	-$1.48	-$0.94	-$0.59

*Bold indicates preferred option

Willingness to Pay for Production Method

Table 42: Choice Modelling - WTP for production method

Production Method	Basic Model	Cluster One Model	Cluster Two Model	Cluster Three Model	Missing Values Model
Pasture	$0.00	$0.00	$0.00	$0.00	$0.00
Feedlot	-$3.62	-$6.74	-$3.73	-$0.90	-$6.98
Organic	**$1.96**	**$2.71**	**$1.96**	**$1.17**	**$2.81**

*Bold indicates preferred option

Willingness to Pay for Branding and Certification

Table 43: Choice Modelling - WTP for branding and certification

Level	Basic Model	Cluster One Model	Cluster Two Model	Cluster Three Model	Missing Values Model
Branded	$0.00	$0.00	$0.00	$0.00	$0.00
Unbranded	-$0.34	-$1.31	-$0.01	-$0.09	-$0.71
Branded and Certified	**$2.45**	**$3.23**	**$2.75**	**$1.14**	**$3.90**

*Bold indicates preferred option

Willingness to Pay to Obtain a Red Coloured Lamb Cutlet

Table 44: Choice Modelling - WTP for colour

Meat Colour	Basic Model	Cluster One Model	Cluster Two Model	Cluster Three Model	Missing Values Model
Red over Red/Brown (x2 for Red over Brown)	$2.12	$3.67	$2.29	$0.96	$2.91

Willingness to Pay to Obtain a Lean Lamb Cutlet

Table 45: Choice Modelling - WTP for marbling

Marbling	Basic Model	Cluster One Model	Cluster Two Model	Cluster Three Model	Missing Values Model
Slight over Moderate (x2 for Slight over Abundant)	$2.56	$3.37	$2.07	$1.17	$4.01

Consumer Price Sensitivity

By looking at these WTP values for each of the three consumer clusters it is possible to report on the likely relative price sensitivity of the consumer groups. If the ratio between the price and the other part-worth measures is large then it indicates that this consumer group is not particularly price sensitive relative to other attributes while a smaller ratio suggests that price plays a stronger part in the purchase decision.

The Committed Organic Seeker group shows a much higher ratio between price and the other attribute values than both the base model and the other two consumer groups indicating they are less price sensitive than the other respondents. This means they will pay to obtain the product they want and are less likely to trade off lower price for a product they consider to be of lower quality. The Convenience Organic Consumer model has similar part-worth ratios to

the base model indicating that they sit around the middle of the pack with respect to price sensitivity. The Incidental Organic Consumers model shows much smaller part-worth ratios which suggest that this group are the most price sensitive. They are more likely to trade off their product attribute preferences in order to obtain a lower purchase price.

5.8   Chapter Summary

This chapter has presented the analysis of the data collected in the survey. Information was presented comparing the demographic information of the survey respondents with national census figures. It was found that the survey was not a representative sample of the national population although, as discussed, this result was expected. Factor analysis was performed to identify the constructs underpinning the attitudinal question results. Cluster analysis was performed which has shown that there are three identifiable consumer groups, Committed Organic Seekers, Convenience Organic Consumers and Incidental Organic Consumers. Choice models were then run and it was found that these consumer groups each had different WTP results for the tested attributes of lamb. While all showed a similar pattern of attribute preferences there was a considerable difference in the stated amount each consumer group said they would pay for the attributes they preferred. Overall the results show there is a demand for an organic lamb product.

Chapter Six – Discussion, Implications and Conclusions

6.1 Overview

This section will review the results presented above, discuss these with reference to the consumer groups identified by the cluster and factor analysis, and consider how these groups are similar or different from the expected consumer profiles based on the literature review. Lastly, implications and recommendations for producers and marketers of organic lamb will be presented.

6.2 Consumer Profiles and Willingness to Pay Measures

When undertaking a discussion of the results found by this study it is important to keep in mind who the sampled respondents are. The study surveyed people from two major metropolitan cities of New Zealand, Wellington and Christchurch. To be considered for inclusion in the study respondents had to be consumers of both organic foods and lamb meat, and the data collection locations were chosen to intentionally maximise the likelihood of shoppers meeting these criteria. The sample cannot therefore be claimed to be representative of all New Zealand consumers and it is not intended that it be so. As discussed earlier there is strong support in the literature for this type of sample selection. When reading the following section the conclusions drawn apply to consumers of lamb and organic food who are aged 18 and over and who live (or at least were shopping at the time of survey) in Christchurch or Wellington.

The information contained in the graphs and tables in chapter 5 can be summarised to create profiles of the consumers in each of the three clusters. These consumer profiles are valuable as they give information about the types of people who are more or less likely to be receptive to the organic lamb product and give strong clues as to the types of appeals that will be successful in attracting these people to the product.

Cluster One Respondents – Committed Organic Seekers

These respondents:

- Agree about attitudes contained in 'intangible at point of purchase'.

- Are neutral about attitudes contained in 'actual perception at point of purchase'.

- Agree about attitudes contained in 'personal impact and effort'.

Respondents in this cluster can be categorised as having overall positive feelings towards organic food; that is, they believe there are benefits to themselves and society from organic food and they are not overly put off by negative perceptions of organic food. They do think availability of organic food is a barrier to their purchase but also that there are significant benefits to the consumption of healthy food. This is the group of respondents we would expect to display a strong demand and WTP for organic food.

In terms of their demographic information respondents in cluster one are distinguished by the following variables:

- Frequency of consumption: they are regular (daily) consumers of organic food.

- Age: they are older, aged 50-69.

- Income: they are middle to high income earners.

- Gender: they are mostly female.

- Family status: they are mostly married.

Due to their strongly positive attitudes towards the intangible aspects of organic food and organic production methods and their positive WTP for farmers market as the purchase location, this group is called Committed Organic Seekers. This group are consumers who eat organic food every day and will actively seek to purchase organic food, even if this requires extra effort.

The CM analysis for the Committed Organic Seekers show that this group displayed the highest WTP for the organic lamb product with a stated WTP of an additional $2.71 per serve for the organic attribute. Given that a serving size in the survey was 150grams this equates to an additional $18.07 per kg. With current prices for lamb cutlets at $29.50 per kg the

Committed Organic Seekers are willing to pay a 61% price premium to obtain an organic lamb cutlet.

Given that Committed Organic Seekers are willing to pay for an organic lamb product it is also important for marketers and producers to consider what other attributes of lamb these consumers consider desirable. Of particular interest for this group is their preference regarding purchase location. This group's preferred location to purchase organic lamb is from a farmers market, with a speciality store (butcher or organic store) as second option and a supermarket as the least preferred. This means that they are quite deliberate in their food purchase behaviour as they must plan and make a special trip to purchase from a farmers market. It is thought that this preference for purchasing from a farmers market may be to do with the belief that the food is genuinely organic, is of high quality and has a 'home-grown' feel to it. What makes this result especially interesting is that this group of consumers also show a high willingness to pay for certification which does not go with the usual farm-gate purchase of products. With a WTP of $2.71 per serve for a branded and certified product over a branded product it is clear that this group of consumers see independent certification as being very valuable to organic food and an assurance of quality and organic status. It is therefore reasonable to suggest that if a certified organic lamb product was made available in supermarkets the certification may go a long way to offsetting the negative feelings this group of consumers has toward the supermarket as a distribution channel. The results also suggest that this group is the most sensitive to the lamb quality markers of colour and marbling. This group was very clear that they preferred a lean cut of lamb that was red in colour. This indicates that health concerns about fat content are very important and the redness is taken as a measure of freshness and is also highly valued.

It is quite clear that those consumers who fall into cluster one are the obvious market for an organic lamb product. As far as a niche producer is concerned, their preference for the farmers market as a distribution channel should be taken as encouraging as it indicates that these consumers are willing to go out of their way to obtain the product they desire. For more traditional distribution channels there is a clear message that in order to tap into this market they must allay concerns about the quality and freshness of the product, emphasise the producer-to-consumer connection, and provide some sort of independent certification of the product's organic status.

Cluster Two Respondents – Convenience Organic Consumers

These respondents:

- Are neutral about attitudes contained in 'intangible at point of purchase'.

- Disagree about attitudes contained in 'actual perception at point of purchase'.

- Are neutral about attitudes contained in 'personal impact and effort'.

Respondents in this cluster can therefore be categorised as having largely neutral feelings about the benefits organic foods offer. Based on existing literature, it is likely that this group will be price sensitive. They would be happy to consume organic food but are unlikely to inconvenience themselves in order to purchase or consume organic food.

In terms of their demographic information respondents in cluster two are distinguished by the following variables:

- Income: they have high income.

- Family status: they are married or living with a partner.

- Number of children: they have children in the house.

- Age: they are aged 30-49

- Frequency of consumption: they are weekly consumers of organic food.

Due to their fairly neutral views on the intangible benefits of organic food, their lack of concern about potential barriers to organic food purchase and their preference for supermarket purchase, this group of consumers is called Convenience Organic Consumers. These consumers will purchase organic food if it easy for them to access but will not purchase organic food for everyday consumption.

The CM analysis showed that the Convenience Organic Consumers have a WTP for organic lamb of $1.96 per serve over the pasture raised product, which equates to a 44% premium. Although a smaller premium than the cluster one group it is still of a size that should be of interest to producers and marketers.

These Convenience Organic Consumers have a different set of preferred attributes to the Committed Organic Seeker; of particular interest is the difference in preferred purchase location. The Convenience Consumer shows a preference for purchasing at the supermarket, with the farmers market as the least preferred option (negative WTP for farmers market of $1.48). This group of consumers are busy people; they have high incomes and children in the household so they want their food shopping to be as quick and easy as possible. They also consider certification of the organic product to be very important (WTP for certification $2.75), indicating that trust in the product is important to them. Interestingly they see no benefit to a branded (but not certified) product over an unbranded product. The Convenience Organic Consumer wants to purchase lamb cutlets that do not have much marbling and are red in colour, although these preferences are not as strong as seen in the Committed Organic Seeker.

The stated willingness to pay a 44% premium over a standard lamb product means that this group of consumers are worthy of consideration for producers and marketers. To sell to the Convenience Organic Consumer the product must be available for purchase on a regular basis at the place they usually shop at. The product must meet their quality standards (low marbling and red colour), but to encourage purchase a clear certification label is an important attribute these consumers would want to see on an organic lamb product. This group should be of particular interest as they are wealthy, from multi-person families (potential for higher consumption) and, given the lack of organic lamb in their preferred distribution channel, are unlikely to be present consumers of organic lamb. This group should be looked at as having considerable potential for growth.

Cluster Three Respondents – Incidental Organic Consumers

These respondents:
- Disagree about attitudes contained in 'intangible at point of purchase'.
- Agree about attitudes contained in 'actual perception at point of purchase'.
- Tending towards disagreement about attitudes contained in 'personal impact and effort'.

Based on these attitudes it is tempting to classify the respondents in this cluster as being opposed to organic food. The attitudes they have stated suggest they do not see any benefits

to themselves or society from organic consumption and they think that organic products do not offer value. They are not overly concerned about the impact of what they eat on their health and do not see the lack of availability of organic food as an issue. These attitudes suggest this group of respondents are unlikely to demand organic food at any price premium, and in fact they may not consume even if the organic product is priced the same as a conventional product. There is a disconnect between the attitudes stated by the Incidental Organic Consumers and their behaviour, however, as they do consume organic food (a criterion of participation in this study) and they showed a WTP for organic lamb thus this group cannot be classified as hostile towards or opposed to organic food. A better description of their behaviour would perhaps be that they are apathetic or indifferent towards organic food and production methods, resulting in an increased sensitivity to any perceived problems with purchasing organic food.

In terms of their demographic information respondents in cluster three are distinguished by the following variables:

- Age: they are generally younger, aged 20-29.
- Family status: they are single.
- Number of children: they have no children.
- Income: they have a wide income range but are more likely to be in the lowest income bracket.

Due to their lack of support for the intangible benefits of organic food, their agreement about the barriers to purchase, and their lower purchase frequency this group is referred to as Incidental Organic Consumers. That is they will purchase when something catches their eye but will not have organic food items as a typical part of their food shopping.

This group was the least supportive towards organic food and production methods and were concerned about the potential negative aspects (such as blemishes on the food or high price) of organic food. As such, it would be reasonable to expect that this group would not show a WTP for the organic attribute however a WTP was found. The CM analysis for the Incidental Organic Consumer group showed a WTP for organic lamb of $1.17 per serve. This equates to a 26% price premium over the standard pasture-raised lamb.

What is interesting about the Incidental Organic Consumer is that they are a lot less concerned about the other tested attributes than the Committed and Convenience Organic Consumers were. They would prefer to buy from a supermarket over a speciality store and prefer either of those options over a farmers market, but the WTP for supermarket location over farmer's market location is only $0.94 per serve. They were also considerably less concerned about feedlot production compared to the other consumers. The Incidental Consumer does prefer the product to be certified, showing a WTP for certification of $1.14 per serve, although again this is considerably less than the other two consumer groups. The Incidental Consumers also wants the product to be slightly marbled as opposed to having abundant marbling and to be red in colour as opposed to brown, however again these WTP measures are much smaller than for either of the other consumer groups.

The implication of the above results for the Incidental Organic Consumer is that this group are price sensitive. They do have their preferences with regards to the product attributes, although these are not as strong as seen in the other groups. This group will seek out the cheaper product even if it means giving up a little in quality. Having said that they did display a significant WTP measure for the organic attribute, which means there is a market to be found selling to the Incidental Consumer. In fact this result should interest potential marketers and producers of organic lamb, as this group provides a potentially excellent outlet for the slightly lower quality products that are produced as an unavoidable result of almost any food production process.

The Missing Consumer Results

It is also worth mentioning the group of consumers that has fallen into the missing consumers group due to the previously discussed survey collection issues. The choice model for this group shows very similar results to the results for the Committed Organic Seeker model. That is, they show a high WTP for the organic attribute while being strongly opposed to feedlot raised lamb. They strongly demand certification of the product with a WTP for certification of $3.90 per serve. They are also very definite that the product should be low in marbling and red in colour, at similar levels to those observed in the Committed Organic Seeker model. The one main difference between the two groups is that while the Committed Organic Seekers

showed a preference for purchasing at farmers markets, the missing cluster consumers show no significant preference for purchase location.

The implication of this is that potentially if the discussed methodological issues had not taken place then the number of respondents falling into the Committed Organic Seeker group could have been much higher (122 respondents fell into the missing consumer group). This result is not surprising to the researcher as a large number of the missing respondents were collected from two stores, Opawa Organics and Moore Wilson. Opawa Organics is clearly a specialist organic food store while Moore Wilson (the part of the store the survey was done in) is a large fresh food market that caters for 'foodie-type' consumers so it would be expected that these consumers would be more likely to embrace the organic lamb product. This is good news for anyone considering producing or marketing organic lamb. This result would increase the number of consumers who show a high WTP for organic lamb and, based on their choice model results, could be called Committed Organic Seekers from 98 to 220 respondents or a total of 49.9% of the survey.

6.3 Comparing New Zealand Regular Consumers of Organic Food to European Regular Consumers of Organic Food

It is important to compare the information gained about the New Zealand consumers in this survey with information on who organic consumers are in Europe. As discussed earlier, there is not a clear profile of who a regular consumer of organic food is. The only real consensus is that an organic consumer will usually be a working age woman of middle-to-upper income. Other studies have reported findings that suggest higher education (Fotopoulos & Krystallis, 2002), incidence of children in the household (Aarset et al., 2004), rural location (FSA, 2008), urban location (Baker et al., 2004) and that younger people are more likely to be supportive towards organic food but older people are more likely to purchase due to financial reasons (Hughner et al., 2007).

Difficulties arise when attempting to compare the consumer profile information gained in this study with that in other studies as they have different entry criteria for participation. Thus the information is not directly comparable. When building consumer profiles, most of the

reviewed studies talk about what regular consumers of organic food do or look like, so more of characteristic X leads to an increase in organic consumption. For this study all respondents are organic consumers, with each identified consumer group having more or less organic consumption. In this data set it is the Committed Organic Seekers that are the regular consumers of organic food. This means that this research cannot say that organic food consumers are generally older but can say that, from this data set, regular consumers of organic food are older and that older consumers of organic food in New Zealand display a higher willingness to pay for organic lamb than younger consumers of organic food.

This study only surveyed people in two metropolitan areas so cannot add to the debate regarding urban compared to rural consumers and their frequency of consumption or willingness to pay for organic food. The results of this study do not support education as an indicator of organic food consumption. Education came out as right on the cut-off line for significance in the make-up of the Committed Organic Seekers cluster and was the second least important factor in the make-up of that cluster. For the other two clusters education was not at all significant in the make-up of the cluster, therefore this study does not provide evidence to suggest that a consumer's education level is indicative of their likelihood to be regular consumers of organic food or that education has an impact on a consumer's WTP for organic lamb.

The results of this study did not provide strong support for incidence of children in the household being an indicator for who will be a regular consumer of organic food. The Convenience Organic Consumers were the only group that had having children present in the household as a significant variable in the make-up of their cluster. The Incidental Organic Consumers had the absence of children in the household as a significant factor in their cluster make-up. The Convenience Organic Consumer group are weekly consumers of organic food and showed the second highest WTP for the organic attribute. This study cannot say that having children in the household is a good indicator that someone will be a regular consumer of organic food. What this result does indicate is that having children, or not having children, may be an indicator of likelihood of organic food purchase but the result is not simple and further research in this area would be beneficial.

Of particular interest is the role that the age of the consumer has on their consumption frequency and willingness to pay for organic food. As mentioned earlier it has been

suggested that younger people hold more positive views towards organic food than older people but may lack the purchasing power to enable translation of these attitudes through to regular consumption. For the respondents in this study this was not found to hold true. Both consumption frequency and willingness to pay were higher for those groups who displayed the most favourable opinions towards organic food and production methods. For each of the three consumer groups in this study, age was a significant factor in the creation of the groups with the Incidental Organic Consumers being the youngest, having the least favourable views of organic food and showing the lowest willingness to pay for the organic lamb product. The Convenience Organic Consumers were the middle aged group, stated fairly neutral attitudes towards organic food while showing the middle WTP for organic lamb. The Committed Organic Seeker group was the oldest of the three groups, displayed the most favourable attitudes towards organic food and showed the highest willingness to pay for the organic lamb product. The results of this study quite clearly show that older consumers have both more favourable attitudes towards organic food and production methods as well as an increased willingness to pay for organic lamb. Younger consumers by comparison display a largely indifferent attitude towards organic food.

The findings of this study are that the regular consumers of organic food in the sample (those who eat organic food at least once a day) are found in the Committed Organic Seeker group. This study finds that regular consumers of organic food are older females from the middle to upper income brackets who are married, living with a partner or a widow/widower. This confirms the established findings from European studies on regular consumers of organic food. The main contribution of this study towards understanding who regular consumers of organic food are is the rejection of the idea that younger consumers are more supportive of organic food and the finding that older consumers, in fact, show more support for organic food and production methods as well as showing a higher WTP for the tested organic product.

6.4   Discussion of Research Questions and Hypotheses

The results presented in 6.2 show that there is a difference in how the surveyed organic consumers view organic food and production methods and in their purchasing preferences and willingness to pay for organic lamb. Given that everyone sampled was a consumer of both organic food and lamb the observed differences between the consumer groups are particularly

interesting. The cluster analysis delivered three distinct profiles of organic consumers. Each of these consumer groups show differences in how they view the tested attributes of the lamb cutlet offered for consideration in the survey and in their attitudes towards organic food in general. While it may seem easy and be tempting to simply classify these three groups as positive towards organic food, neutral towards organic food and negative towards organic food this would not be correct. These groups are supportive of organic food to some degree as they are all organic food consumers, leading to the description of the three consumer groups as being committed seekers, convenience and incidental consumers of organic food respectively.

The six hypotheses will now be discussed followed by a discussion of the key research objectives. Initially it was not thought that factor analysis would be done on the data set the hypotheses cannot be dealt with as directly as first envisaged. Reference cannot be made to which consumers will show the increased WTP as a result of support for one, two or three attitudinal questions, but those attitudes relevant to the hypothesis must be talked about with reference to the factor they fall into.

H1: Consumers who state they are concerned about the impact they have on the environment will show an increased willingness to pay for organic lamb.

Hypothesis one is supported by the results. The attitudes that relate to this proposition both fall into the 'intangible at point of purchase' factor and the consumer group to whom this factor was the most important was the Committed Organic Seeker. This group also had the highest WTP measure for organic lamb.

H2: Consumers who are concerned about and feel responsible for their own health will show an increased willingness to pay for organic lamb.

Hypothesis two is supported by the results. The attitudes that relate to concern and responsibility for one's own health fall into the 'intangible at point of purchase' factor, with the health measurement based on the presumption that organic food is better due to its absence of potentially harmful things. This statement also fits into the 'personal effort and impact' factor, with the response to the statement 'what I eat has a big impact on my health'. Both these factors are more important to the Committed Organic Seeker than the other two

consumer groups and they had the highest WTP for organic lamb. This is therefore in agreement with Squires et al (2001) that concern for personal health is a key driver of organic food consumption in New Zealand.

H3: For New Zealand consumers, food safety concerns will NOT positively affect the purchase of organic lamb.

Hypothesis three is not supported by the results in fact the opposite seems to be true. Beliefs about the relationship between food safety and organics loaded into the 'intangible at point of purchase' factor which, as discussed earlier, is an important predictor of increased WTP for the organic lamb product. The fact that the attitudinal statement that organic food is safer than genetically modified food was the most important variable to defining this factor shows that concerns about genetically modified food are very important to organic consumers in New Zealand. However the survey did not assess non-organic consumers so their food safety concerns could not be analysed.

H4: Consumers who reject feedlot production methods will show an increased WTP for organic lamb.

Hypothesis four is strongly supported. The feedlot attribute attracted the largest co-efficient value in all the models except for the Incidental Organic Consumers model. This means that in each model the avoidance of feedlot production was the attribute that consumers felt most strongly about. Furthermore the group that was most strongly against feedlot production, the Committed Organic Seekers, also showed the highest WTP for the organic lamb product.

H5: Consumers will have a lower WTP for organic lamb if it is not available in their usual place of food shopping.

The results of this study do not provide a clear conclusion to suggest support for or against this hypothesis. One of the issues here is that the study did not actually ask where the consumer's usual place of shopping is, but instead assumed it to be their local supermarket. This may affect the interpretation of the results if some of the respondents usually shop (for meat products) at a speciality store or farmers market. Based on the reviewed literature, which suggested that availability was the second biggest barrier to purchase of organic food

after price, it was thought that having the lamb product available at the supermarket would be preferred. It was somewhat surprising, then, that the Committed Organic Seekers actually stated a preference for purchase at a farmers market. The other groups showed a slight preference for the supermarket option over speciality store, with farmers market the least preferred. We are left with the consumer group most supportive of the organic lamb product prefers the farmers market option and the rest of the sample prefers the supermarket purchase option.

This hypothesis is somewhat difficult to draw a clear conclusion on. This was the only attribute for which the consumer groups favoured different options. The availability attitudinal question loaded onto the 'personal effort and impact' factor, which was seen as important by the Committed Organic Seeker but not by the other two consumer groups. Interestingly, the Committed Organic Seeker showed a WTP preference for lamb purchased at a farmers market while the other two groups showed a preference for the supermarket as the purchase location. The base model shows a slight WTP for the supermarket option over speciality store and farmers market, so overall, hypothesis five is supported but not strongly.

H6: Certification of the product will increase WTP for organic lamb.

Hypothesis six is supported by the results of this study. The mistrust of certification loaded onto the 'actual perception at point of purchase' factor. This factor was most strongly supported by the Incidental Organic Consumers, with the Committed Organic Seekers being fairly neutral and the Convenience Organic Consumers disagreeing with this factor. For the Incidental Organic Consumers this makes sense as it shows the group who least trust organic labelling are also the least willing to pay a premium for certification, indicating they may not trust the certification process. From the choice models the WTP value for certification over branding was very strong across the board, with the highest value stated by the Committed Organic Seekers and the lowest by the Incidental Organic Consumers. It is reasonable to suggest that the Committed Organic Seekers are likely to be the best informed as to what the certification labels mean and to have more trust in them, and therefore are willing to pay more for certification.

6.5 The Market for Organic Food in New Zealand and Selling the Perfect Piece of Lamb

The size of the New Zealand domestic market for organic food has not received a lot of research. The best available figures come from Organics New Zealand who have just released a briefing paper to the new government on the state of the organic food market and organic food production in New Zealand. This paper values the domestic organic food market at NZ$210 million per annum or 1.1% of total food and beverage sales in 2007 (OANZ, 2008). It also shows that organic meat is purchased by 9% of all households in New Zealand and that 46% of that meat is sold through supermarkets (OANZ, 2008). Considering that BioGro (one of the two largest organic certification companies in New Zealand) valued the total market for organic food in New Zealand at NZ$100 million per annum in 2004 (www.biogro.co.nz/marketinformation) this shows a very strong growth rate not dissimilar to growth rates seen in Europe as discussed in Chapter 2.

It seems that there is a potential market for an organic lamb product if it was made readily available to the public and that while this market may currently be small, strong growth rates could be expected. Given this market situation and the fact that the results of this study indicate that half the consumers surveyed show WTP a premium over pasture-raised lamb of over 60%, the question now is what combination of attributes should be presented to the consumer to generate the highest possible price? According to the WTP results of this study, in order to provide a lamb product with the highest likely retail value producers and marketers should attempt to make available a lamb product that has the following attributes:

- Organic
- Low marbling/lean
- Red in colour
- Certified by an independent authority

It was thought that availability would be a key issue for consumers; however the Committed Organic Seekers show a preference for alternative distribution channels that require more effort and planning on the consumer's behalf. This is encouraging as it shows the consumers who state the highest willingness to pay do not require wide-ranging distribution into local

supermarkets. However to grow this category to include the Convenience and Incidental Organic Consumers it is recommended that the products are made available in some supermarkets.

Also to be considered is the likely appeals that will help attract each identified consumer group to purchase the product. For the Committed Organic Seeker the appeals should leverage off or reinforce their belief that the organic food is healthier for them personally at the individual level, is an ethically correct way to behave towards animals, is better for society through supporting more traditional farming methods and that organic production methods are better for the environment. These consumers who have a genuine belief in the intangible benefits of organic food, so marketing appeals that speak to these beliefs and associated lifestyle values will be a successful strategy to sell to the Committed Organic Seeker.

The Convenience Organic Consumers are fairly neutral in their belief in the intangible benefits of organic food and production methods, therefore making appeals based on potential long term benefits to society and the environment unlikely to resonate as effectively with this group. A better strategy for this group is to market the products as the best, most healthy option for this consumer's family. As the group with the highest incidence of children in the household, emphasising what an organic product is not (i.e. not genetically modified, not sprayed with synthetic chemicals) and so by association that it is a safer and healthier product to feed their families. There is also some potential for leveraging off the increased awareness of animal welfare issues that television programs such as Jamie Oliver's Big Food Fight have created. The Food Standards Agency (2008) study found this show and other media exposure has greatly increased the profile of animal welfare issues in consumer's minds when they are purchasing food. Thus emphasising the free-range, naturally raised aspects of organic food may be a successful strategy given the current topical nature of these issues

The Incidental Organic Consumer does not show support for the intangible benefits of organic food. While the above mentioned media coverage of these issues may increase their perception of these benefits over time, at this stage the findings of this research indicate they do not see organic food as having particular benefit over conventional food. They also perceive more problems with organic food products in terms of appearance and price than the other two consumer groups do. Given these results it may seem somewhat surprising that this

consumer group still displayed a WTP for the organic lamb product. This means that despite their unfavourable attitudes these consumers will still purchase, and pay a premium for, organic lamb. They acknowledge the flaws and will purchase anyway, meaning this consumer group is ideal for selling the product that is not of top grade at a lower price. As far as marketing appeals go, this group is young and single so focusing on making the benefits of organic food as direct and personal as possible will be the best strategy while maintaining a sharp price. Even though the results show that branding is not seen as an important indicator of quality, it may be important to make some branding differentiation between the top quality organic lamb products selling for the higher premium and the lower quality, cheaper product line. It is important that the lower quality lamb products sold cheaply do not detract from the high quality product image that needs to be conveyed to attract the other consumer groups. To preserve this quality product image and the higher price premiums a multi-branding strategy (Chen & Paliwoda, 2002) may need to be employed, where the lower quality, cheaper products are sold under a different brand label to the one used by the rest of the product line.

6.6   Difficulties and Limitations of the Research

Location

The data collection locations are a limiting factor for this research. While the survey did manage to sample a good number of consumers in Christchurch and Wellington the results may have been improved by sampling consumers in Auckland as well. Including the largest city in New Zealand in the results may have improved the representativeness of the sample. However the resources available for the research confined the surveying to Christchurch and Wellington.

It would have been of considerable interest and benefit to the project if data collection could have been done in a city such as London. The UK is a key export market for New Zealand lamb products, and being able to sample consumer responses in this market would have made the results of this study of considerably more benefit to the lamb industry in New Zealand.

Unfortunately despite a considerable amount of effort on the part of the researcher to secure funding to collect data in London, funding was not forthcoming.

Data collection issues

The data collection issue is the previously discussed problem of the missed attitudinal questions. This missing information was unfortunate as it reduced the usable sample for the factor analysis process and therefore ended up reducing the number of respondents that could be assigned to clusters for consumer profiling purposes. It is thought that with knowledge of the potential for this problem to occur a few simple changes in how the survey appears on the touch-screen computers would largely eliminate this problem.

Survey Bias

As discussed earlier the survey sample is intentionally biased in that the respondents had to be existing consumers of organic food and of lamb. This means that the results presented and conclusions drawn are only applicable to people who fit into these categories and cannot claim to apply to all consumers in New Zealand.

This potential problem has to do with the way the survey was presented and how that may have artificially increased the sensitivity to the organic factor in the minds of the respondents. A screening question was about organic food consumption. The first screen of the survey was title Lincoln University Organic Food Survey. The questions leading up to the choice modelling section were mostly about organic food and production methods. This may have had the effect of artificially raising the awareness and sensitivity of the organic production method in the minds of the respondents. This may have meant that respondents favoured the organic option more than usual or may have selected it more often than they otherwise would because they thought it was the right thing to do. This is perhaps an unavoidable situation, however some potential ways to reduce this impact would be to remove the word organic from the first screens so the survey became a Lincoln University Food Survey. Potentially the choice modelling section could have been placed before the attitudinal questions section so respondents had less exposure to the organic issues before they answered the choice section.

This may have itself caused problems if respondents became flustered by being asked the more complex questions first and so dropped out before completing the survey.

Another potential source of bias was at the respondent selection stage. Although instructions were given to those administering the survey to pick a number such as five depending on store traffic flow and only approach the fifth person who walked past in reality anyone who showed an interest in the survey was invited to participate in order to gather enough respondents in the required time. The potential respondent selection bias was therefore two-fold, on behalf of the researcher or research assistants in the people they chose to approach and through self-selection on behalf of the respondent. This respondent self selection could have come from shoppers who, when seeing the title page of the survey on the computer screen, decided to participate or not based on the strength of their feelings towards organic food. It is entirely likely that people who felt strongly about organic food would be more likely to stop and participate in the survey. This is not necessarily a bad thing, due to this study requiring participants to be organic food consumers anyway.

6.7   Contribution

The key contribution of this research is to give a WTP measure for organic lamb for consumers of organic food and lamb in New Zealand. This is an important result as it gives producers and marketers of lamb a good indication of potential selling prices if they were to make such a product available to the New Zealand public. In addition this study contributes WTP measures of other attributes of lamb that should also be of use to those involved in lamb production and the sale of lamb meat.

The second major area of contribution this study makes is to the body of knowledge regarding the likely profile of consumers of organic food. The results in this study are particularly interesting as they give profiles for regular, weekly and occasional consumers of organic food.

6.8   Future Research Potential

The most obvious extension to this research would be to take this study to cities in key export markets overseas such as the United Kingdom. This information would be of considerable benefit to the producers and marketers of lamb products in New Zealand in enabling them to make informed decisions about whether or not to attempt to push into the organic market. It would be especially interesting to see if the huge gap in willingness to pay between an organic and a feedlot-raised lamb holds up in countries where feedlot production is a common or even the usual method of production.

Another interesting result from this study that would be very interesting to test in the UK market is if the WTP gap between certification and branding is maintained and whether also the lack of WTP for a branded product over an unbranded one is observed. It is the opinion of the researcher that because the New Zealand market for organic food is still in its infancy organic food brands do not have much market presence or lack recognition, so consumers consider certification to be more valuable assurance of quality than a brand. However in a more developed organic food market where strong organic food brands do exist consumers would have developed trust in these brands and so see the brand as having quality assurance value.

The third opportunity for extension of this research would be to undertake a similar study using a different product or products to see if the WTP premiums for the organic attribute are the same or different if a product other than lamb is used.

Finally, another potential extension of this project is to use more advanced choice modelling analysis techniques (the mixed multinomial logit for example) to mine the data set for potentially richer and more detailed conclusions about the respondents and their willingness to pay for organic lamb. One may also decide that it is of benefit to attempt to re-classify the consumer segments to include those responses which were set aside due to the four missing attitudinal questions. This could potentially be done by excluding these four questions from all the respondents which would obviously reduce the richness of the consumer profiles but would add back an increased sample size and include more respondents from these two interesting purchase locations.

6.9 Conclusions

The motivation for this study was to investigate potential consumer demand for an organic lamb product to see if this would be a way for the New Zealand lamb industry to increase the sale price of its products. Specifically, the study sought to gain willingness to pay measures for different attributes of lamb with the goal of seeing if lamb raised under organic production methods would attract a greater WTP than lamb raised under traditional methods. The study also sought to create consumer profiles of organic consumers in New Zealand with the specific aim of enabling a comparison of regular consumers of organic food in New Zealand with European regular consumers of organic food.

The study used CAPI to deliver a survey to consumers of organic food and lamb in supermarkets and speciality stores in Christchurch and Wellington. The collected data was analysed using factor analysis on the attitudinal questions, followed by cluster analysis on the created factors and demographic questions to create profiles of organic consumers in New Zealand. The choice modelling data was analysed using the multinomial logit to gain measures of WTP for the tested attributes of lamb for the total sample and to gain WTP measures for each consumer group.

The results showed that there are three different organic consumer profiles in the sample collected. These groups were labelled as Committed Organic Seekers, Convenience Organic Consumers and Incidental Organic Consumers. Of these groups it was the Committed Organic Seekers who are the regular consumers of organic food in New Zealand. Their consumer profile is they are mostly female, older, married and of middle to high income. As far as their attitudes go they agree with the attitudes that fell into the 'intangible at point of purchase' factor; these are predominantly benefits that people hope will occur from the consumption of organic food but may be hard to quantify. They agreed with the 'personal impact and effort' factor which deals with responsibility for one's own health and the effort required to consume organic food and they were neutral about the attitudes in the 'actual perception at point of purchase' factor, which deals with possible barriers to organic consumption. This information adds to the body of knowledge regarding the likely profile of the regular organic food consumer which, as discussed, has not yet reached much of a consensus regarding the demographic make-up of this consumer group.

The choice modelling section showed that half of the respondents in this survey state a WTP premium for organic lamb over pasture-raised of over 60% and that even the group that showed the lowest WTP, the Incidental Organic Consumers, stated a WTP premium of 26% for the organic attribute. These figures in New Zealand's relatively undeveloped organic food market should be of interest to producers and marketers of lamb in New Zealand, especially given the growth in the market for organic food here but also more importantly in key European export markets. Other attribute WTP measures of particular interest were the lack of benefit consumers perceived from having a branded product compared to an unbranded product. It is quite clear that for New Zealand consumers of organic food, independent certification is highly valued while branding is not. The choice modelling results show that producers and marketers of lamb should attempt to sell a lamb product that is certified organic, low in marbling and red in colour in order to gain the highest price for their products. The purchase location question did not attract a strong result, although overall availability at a supermarket is the preferred purchase location.

This study shows that there is demand in the local market for an organic lamb product. It is the strong recommendation of the researcher that a similar study be undertaken in key export markets to test if the conclusions of this study hold true. If this is the case then organic lamb production could be an important way to increase the selling price of New Zealand lamb.

References

Aarset, B., Beckmann, S., Bigne, E., Beveridge, M., Bjorndal, T., Bunting, J., McDongh, P., Mariojouls, C., Muir, J., Prothero, A., Reisch, L., Smith, A., Tveteras, R. & Young, J. (2004). The European consumers' understanding and perceptions of the "organic" food regime: the case of aquaculture. *British Food Journal*. 106(2/3), pg 93-105.

Baker, S., Thompson, K.E. & Engelken, J. (2004). Mapping the values driving organic food choice: Germany vs the UK. *European Journal of Marketing*. 38(8), pg 995-1012.

Bartholomew, D.J. (2005). History of Factor Analysis: A Statistical Perspective. *Encyclopedia of Statistics in Behavioral Science,*Vol.2. John Wiley and Sons Limited, pg 851-858.

Batley, R. & Daly, A. (2006). On the equivalence between elimination-by-aspects and generalised extreme value models of choice behaviour. *Journal of Mathematical Psychology*. 50(5), pg 456-467.

Bronner, F. & Kuijlen, T. (2007). The live or digital interviewer: A comparison between CASI, CAPI and CATI with respect to differences in response behaviour. *International Journal of Market Research*. 49(2), pg 167

Botonaki, A., Polymeros, K., Tsakiridou, E. & Mattas, K. (2006). The role of food quality certification on consumers' food choices. *British Food Journal.* 108(2/3), pg 77-90.

Burton, M., Rigby, D., Young, T. & James, S. (2001). Consumer attitudes to genetically modified organisms in food in the UK. *European Review of Agricultural Economics*. 28(4), pg 279-298.

Chen, J. and Paliwoda, S.J. (2002). On the application of multi-branding strategy. *American Marketing Association, Conference Proceedings.* AMA Educators Proceedings 13, pg 43-61.

Chinnici, G., D'Amica, M. & Pecorino, B. (2002). A multivariate statistical analysis on the consumers of organic products. *British Food Journal.* 104(3-5), pg 187-199.

Darton, R. (1980). Rotation in factor analysis. *The Statistician*. 29(3), pg 167-194.

Fillion, L. & Arazi, S. (2002). Does organic food taste better? A claim substantiation approach. *Nutrition and Food Science*. 32(4), pg 153-157.

Food Standards Agency (2008). Consumer priorities for sustainable development. *FSA/COI SD Research Report.* Retrieved December 5, 2008 from http://www.food.gov.uk/science/socsci/surveys/sustainability

Fotopoulos, C. & Krystallis, A. (2002). Organic product avoidance: reasons for rejection and potential buyers' identification in a countrywide survey. *British Food Journal.* 104(3-5), pg 233-260.

Gil, J.M., Gracia, A., & Sanchez, M. (2000). Market segmentation and willingness to pay for organic products in Spain. *International Food and Agribusiness Management Review*, 3 (2000) pg 207-226.

Gracia, A. & Albisu, L.M. (2001). Food consumption in the European Union: main determinants and country differences. *Agribusiness*. 17(4), pg 469-488.

Hair, J.F., Anderson, R.E., Tatham, R.L., and Black, W.C. (1995). *Multivariate Data Analysis with Readings (4th Edition)*. New Jersey, Prentice-Hall Inc.

Harper, G. & Makatouni, A. (2002). Consumer perception of organic food production and farm animal welfare. *British Food Journal*. 104(3-5), pg 287-299.

Harper, G. & Henson, S. (2001). *Consumer concerns about animal welfare and the impact on food choice*. Reading, UK. The University of Reading, Centre for Food Economics Research. EU Fair CT98-3678.

Hensher, D.A., Rose, J.M. & Greene, W.H. (2005). *Applied Choice Analysis: A Primer.* Cambridge, UK. Cambridge University Press.

Hensher, D. (2006). Revealing Differences in Willingness to Pay due to the Dimensionality of Stated Choice Designs: An Initial Assessment. *Environmental and Resource Economics.* 34(1) pg 7-44.

Hughner, R.S., McDonagh, P., Prothero, A., Shultz II, C.J. & Stanton, J. (2007). Who are organic food consumers? A compilation and review of why people purchase organic food. *Journal of Consumer Behaviour.* 6, pg 94-110.

Improving the lamb price must be priority. (2007). *Farmers Guardian (3).* Retrieved February 9, 2008, from ABI/INFORM Trade & Industry database. (Document ID: 1294648421).

Kanninen, B. (2002). Optimal design for multinomial choice experiments. *Journal of marketing research.* pg 214-227.

Kennedy, P. (2003). *A guide to econometrics (5th ed.).* Cambridge, Massachusetts. The MIT Press.

Kidd, R.S., Rossignol, A.M. & Gamroth, M.J. (2002). Salmonella and Other Enterobacteriaceae in Dairy-Cow Feed Ingredients: Antimicrobial Resistance in Western Oregon. *Journal of Environmental Health,* 64 (3)

Kim, J. O. and Mueller, C. W. (1978). Factor Analysis, statistical methods and practical issues*. Sage University paper series on quantitative applications in the social sciences,* series no. 07-014. Sage Publications California.

Krystallis, A. & Chryssohoidis, G. (2005). Consumers' willingness to pay for organic food: factors that affect it and variation per organic product type. *British Food Journal.* 107(4/5), pg 320-343.

Kuhfeld, W.F. (2005). *Experimental design, efficiency, coding and choice designs,* pg 47-97 IN Marketing Research Methods in SAS from http://support.sas.com/techsup/tnote/tnote stat.html#market.

Kuhfeld, W.F., Randall, T.D. & Garratt, M. (1994). Efficient experimental design with marketing research applications. *Journal of Marketing Research.* 31(4), pg 545-557.

Lancaster, K.J. (1966). A new approach to consumer theory. *The Journal of Political Economy.* 74(2), pg 132-157.

Lea, E. & Worsley, T. (2005). Australians' organic food beliefs, demographics and values. *British Food Journal.* 107(10/11), pg 855-869.

Levinson, D., Paltiel, A., Nir, M. & Makovki, T. (2007). The Israel national health survey: issues and methods. *The Israel Journal of Psychiatry and Related Sciences.* 44(2), pg 85-94.

Liebhardt, B. (2001). Get the facts straight: organic agriculture yields are good. *Organic Farming Research Foundation.* 10, pg 1-5.

Lohr, L. 2001. Factors Affecting International Demand and Trade in Organic Food Products. IN: *Changing Structure of Global Food Consumption and Trade.* A. Regmi (ed.). ERS WRS No. 01-1, USDA Economic Research Service, Washington, DC, p. 67-79.

Long, J. (2006). Power of supermarkets 'frightening'. *Farmers Weekly,* 144(6), pg 52.

Loureiro, M.L. & Umberger, W.J. (2007). A choice experiment model for beef: what US consumer reponses tell us about relative preferences for food safety, country-of-origin labelling and traceability. *Food Policy.* 32(4), pg 496-514.

Louviere, J.J., Hensher, D.A. & Swait, J. (2000). *Stated choice methods: analysis and applications.* Cambridge, UK. Cambridge University Press.

Isley, P.W. (1974). *Factor analysis as a technique for economics*. M.A. dissertation, Florida Atlantic University, United States -- Florida. Retrieved October 19, 2008, from ABI/INFORM Global database.

Lusk, J.L. & Schroeder, T.C. (2004). Are choice experiments incentive compatible? A test with quality differentiated beef steaks. *American Journal of Agricultural Economics*. 86(2), pg 467-482.

McEachern, M.G. & Willock, J. (2004). Producers and consumers of organic meat: a focus on attitudes and motivations. *British Food Journal*. 106(6/7), pg 534-552.

McFadden, D. (1974). Conditional Logit Analysis of Qualitative Choice Behavior. *Frontiers in Econometrics*, P. Zarembka, ed. New York: Academic Press, 105(42).

McFadden, D. & Train, K. (1998). Mixed MNL Models for Discrete Response. *Journal of Applied Econometrics*. 89(1), pg 109-129.

McFadden, D. (2001). Economic Choices, Nobel Lecture, December 2000. *American Economic Review*, 91(3), pg. 351-378.

Makatouni, A. (2002). What motivates consumers to buy organic food in the UK? Results from a qualitative study. *British Food Journal*. 104(3-5), pg 345-352

Manly, B.F.J. (2005). *Multivariate Statistical Methods, A Primer (3rd Edition)*. Florida, Chapman and Hall/CRC Press.

Marschak, J. (1974). *Economic Information, Decision and Prediction:* selected essays volume 1. Dordrecht, Holland. D. Reidel Publishing Company.

Mellon, M., Benbrook, C. & Benbrook, K. (2001). Hogging It. Estimates of Antimicrobial Abuse in Livestock. *Union of Concerned Scientists*. , UCS Publications, Cambridge, MA

Misra, S.K., Huang, C.L. & Ott, S.L. (1991) Consumer Willingness to Pay for

Pesticide-Free Fresh Produce. *Western Journal of Agricultural Economics,* 16(2): pg. 218-227.

Mol, J. (1976). *Factor Analysis in Research.* Institute of Economic Research State University Groningen, the Netherlands.

O'Donovan, P., & McCarthy, M. (2002). Irish consumer preference for organic meat. *British Food Journal.* 104(3-5), pg 353-370.

Ott, S.L. (1990). Supermarket shoppers' pesticide concerns and willingness to purchase certified pesticide residual-free fresh produce. *Agribusiness.* 6(6), pg 593-602.

Padel, S. & Foster, C. (2005). Exploring the gap between attitudes and behaviour. Understanding why consumers buy or do not buy organic food. *British Food Journal.* 107(8), pg 606-625.

Reynolds, T.J. & Whitlark, D.B. (1995). Applying Laddering Data to Communications Strategy and Advertising Practice. *Journal of Advertising Research.* 35(4), pg 9-17.

Rimal, A. (2005). Meat labels: consumer attitude and meat consumption pattern. *International Journal of Consumer Studies.* 29(1), pg 47-54.

Roddy G., Cowan, C. & Hutchinson, G. (1996). Consumer Attitudes and Behavior towards Organic Foods in Ireland. *Journal of International Consumer Marketing.* 9(2), pg 41-63.

Schroder, M.J.A. & McEachern, M.G. (2004). Consumer value conflicts surrounding ethical food purchase decisions: a focus on animal welfare. *International Journal of Consumer Studies.* 28(2), pg 168-177.

Schifferstein H. & Ophuis, O.P. (1998). Health-related determinants of organic food consumption in the Netherlands. *Food quality and Preference.* 9(3), pg 119-133.

SPSS base 15 user's guide. (2007). Inc. SPSS, USA.

Squires, L., Juric, B. & Cornwell, T.B. (2001). Level of market development and intensity of organic food consumption: cross-cultural study of Danish and New Zealand consumers. *The Journal of Consumer Marketing*. 18(4/5), pg 392-409.

Tandy, M. (2006). How clean, how green? Critics say New Zealand doesn't live up to its image. *The Environment Magazine.* May-June, 2006.

Taylor, C. (2008, June 22). Why we're not so clean, green. *New Zealand Herald*, pg, B1.

Taylor, S. (2008). Lamb price lull takes shine off monitor farm. *Country-Wide*. Retrieved 03/05/08 from www.country-wide.co.nz/article/9302.html

Thompson, G.D. & Kidwell, J. (1998). Explaining the choice of organic produce: cosmetic defects, prices and consumer preferences. *American Journal of Agricultural Economics*. 80, pg 277-287.

Tregear, A., Dent, J.B. & McGregor, M.J., (1994). The demand for organically-grown produce. *British Food Journal.* 96**(**4), pg 21–25.

Understanding the costs and risks of conversion to organic production systems, MAF technical paper 2002/1. Retrieved December 20, 2008 from http://www.maf.govt.nz/mafnet/rural-nz/sustainable-resource-use/organic-production/converting-to-organic-production/index.htm

Verhoef, P.C. (2005). Explaining the purchases of organic meat by Dutch consumers. *European Review of Agricultural Economics*. 32(2), pg 245-267.

Zanoli, R., & Naspetti. (2002). Consumer motivation in the purchase of organic food: a means–end approach. *British Food Journal.* 104(8), pg 643–653.

www.organic-europe.net, retrieved 17/03/08
www.stats.govt.nz, retrieved 12/05/08
www.zespri.com/images/pdf/annualreport, retrieved 20/02/08
www.biogro.co.nz retrieved 11 December 2008

www.newzealandlamb.org retrieved 17 December 2008

www.soilassociation.org retrieved 19 December 2008

Appendices

Appendix A

Explanation of attributes and levels for the choice modelling questions given to survey respondents.

Price

The price was calculated by averaging five prices for lamb cutlets from local stores to obtain a base measure. The options for price were then varied by set percentages.

Availability

These three options indicate a range of options for where you might purchase lamb.

Regular supermarket: This is the usual place you shop for the majority of your food.

Speciality shop: This is a place you might go to purchase a limited number of food items, will require some more effort to get to than your regular supermarket.

Weekend farmers market: This option for purchase is available only on weekends and will require more effort/time to get to than the other two options.

Production method definitions

Intensive Feedlot: Animals are kept in a smaller space than other production methods, sometimes indoors for most of their lives. They are fed on grain and may be fed animal by-products to supplement their diets. There are no restrictions on animals being given hormones and antibiotics to assist with their growth and/or health.

Grass-fed: Sheep live outside and their diet consists mainly of grass with supplementation of other feed and forage if required. The grass may be fertilised and sprayed with synthetic treatments as required. They are not given any hormones and only receive antibiotics by injection if they are sick. The animals will be treated with synthetic animal health remedies to prevent diseases as required.

Organic: This production method mandates that no synthetic chemicals, hormones, antibiotics or animal by-product supplementation be used during the entire life of the sheep including in or on the food they eat. The sheep will eat grass with other forage supplementation as needed.

Colour

Three levels for options of the colour of the lamb cutlet are offered. You should choose the colour you think is the most preferable.

Intramuscular fat (Marbling)

Marbling shows up as flecks of fat within the muscle as opposed to fat around the outside of the meat.

Branding and Certification

Three options for branding and certification will be offered:

No Branding: Only a store label with information such as price, weight and date of packing is attached to the meat.

National Branding: This label will contain information about price, weight and date of packing. The meat also has a recognised nationally recognised brand attached to the meat. A good example of this would be the Tegel brand for chicken.

National Branding with Certification: This label has information about price, weight and date of packaging as well as a carrying a nationally recognised brand name. In addition the product is certified by the Ministry of Fisheries and Agriculture (MAF) that it meets any claims the manufacturer has made about the product, for example its organic status.

Appendix B

Attitudinal statements about organic food and production methods.

Positive statements about organics	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Organic food tastes better than conventionally produced food	110	158	145	19	3
Organic food is better for me than conventional food because it does not contain any chemical residues	188	179	46	14	7
Organic farming methods are better for the environment than conventional methods	161	137	61	6	3
Organically farmed animals do not suffer from diseases such as foot and mouth or mad cow	37	82	221	66	24
Organic foods are safer than foods which have been genetically modified	151	147	93	28	9
Negative statements about organic food					
Organic food does not look as good as conventionally	23	122	148	102	38

produced food					
Organic food is too expensive	90	196	94	49	8
I do not trust organic labelling	6	56	130	140	32
Organic food is too hard to find in the places I usually shop	31	143	99	134	24
Environment and health statements					
I am concerned about the impact I have on the environment	154	164	36	11	3
What I eat has a big impact on my health	236	124	6	2	0
How animals are treated is an important factor in my food choices	139	180	82	27	3

Appendix C

Crosstab results for attitudinal, demographic and consumption frequency questions.

Key:

Q5   Organic food consumption frequency

Q6   Lamb consumption frequency

Q7   Organic food tastes better than conventionally produced food

Q8   Organic food does not look as good as conventionally produced food

Q9   Organic food is better for me than conventional food because it does not contain any chemical residues

Q10 Organic food is too expensive

Q11 I do not trust organic labelling

Q12 I am concerned about the impact I have on the environment

Q13 What I eat has a big impact on my health

Q14 Organic farming methods are better for the environment than conventional methods

Q15 Organically farmed animals do not suffer from disease such as foot & mouth or BSE ("mad cow")

Q16 Organic food is too hard to find in the places I usually shop

Q17 How animals are treated is an important factor in my food choices

Q18 Organic foods are safer than foods which have been genetically modified

Q28 Age

Q29 Family status

Q30 Number of children in house

Q31 Household income

Q32 Education level

Question	15	16	17	18	19	10	11	12	13	14	15	16	17	18	27	28	29	30	31	32
5																				
6																				
7	X																			
8			X																	
9	X		X																	
10	X		X	X																
11				X	X	X														
12	X		X		X															
13			X																	
14	X		X		X			X												
15	X		X		X					X										
16	X		X							X	X									
17	X		X		X			X		X	X									
18	X		X	X	X		X	X		X	X	X	X							
27	X		X					X		X	X	X	X	X						
28	X	X	X	X	X	X	X						X							
29				X						X		X	X							
30																				
31					X															
32	X													X						

Crosstab results in the above table have chi-statistic result <0.05 meaning these results are significant at the 95% confidence level or better.