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Value-added poultry product development:
A consumer driven approach

by

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Abstract

To provide consumer oriented insight into the expanding market for value-added chicken product development, consumer science and econometric techniques were used to identify consumer perceptions and willingness to pay for chicken product attributes. 'Convenience' and 'health' were positively perceived attributes of unprocessed products while traditional processed products such as chicken nuggets represented undesirable composition, processing and quality concerns. Consumers had a strong preference for a refrigerated free range chicken breast product, without additives/preservatives or added flavour that could be oven heated. Microwaveable and organic products were less preferred. Half of respondents were willing to pay around 30% more for a value-added chicken product over the price of a conventional one. This information will allow poultry processors to develop new value-added chicken products in response to current consumer attribute preferences while maintaining a price that could enhance not only their profits but consumer satisfaction.

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List of Abbreviations

AAFC	Agriculture and Agri-Food Canada
CA	Conjoint Analysis
CFC	Chicken Farmers of Canada
CVM	Contingent Valuation Method
FAO	Food and Agriculture Organization
Fig	Figure
GM	Genetically Modified
GPA	Genaralized Procustes Analysis
Kg	Kilogram
LINMAP	Linear Programing Technique for Multidimensional Analysis of Preference
Logit model	Logistic regression
MANOVA	Multivariate Analysis of Variance
MLM	Maximum Likelihood Method
NPD	New Product Development
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
PANOVA	Procrustes Analysis of Variance
PASW	Predictive Analytics Software
RGM	Repertory Grid Method
RI	Relative Importance
RUM	Random Utility Maximization
SPSS	Statistical Package for the Social Sciences
Stata	Statistical software package named after STATistics and daTA
TVA	Total Variance Accounted
WTP	Willingness To Pay

Chapter 1

Introduction

1.1 Introduction

Currently, about half of the world's population consumes chicken (Roenigk, 1999; Al-Nasser, 2006). In 1995, worldwide poultry meat production surpassed beef and pork (Windhorst, 2006), and poultry meat has continued to gain popularity and market throughout the world (Resurrección, 2004; Magdelaine *et al.*, 2008). By 2009, global poultry meat production is expected to increase to 94.6 million tonnes, a 3% increase in comparison to the previous year (FAO, 2008).

In Canada, the poultry processing industry has experienced continuous growth in recent years (Classen & Schwean, 1998; AAFC, 2007). Today chicken is considered the favourite meat protein among Canadians, and according to the Chicken Farmers of Canada's (CFC) 2007 Usage and Attitudes Report, about 75% of consumers prefer chicken over other meat products. In order to maintain chicken's popularity among consumers and promote growth of the Canadian poultry industry by translating consumer needs into product specifications, it is desirable to identify the factors that drive consumers' preference for chicken products as well as their important product attributes.

1.2 The Canadian Chicken Market

Over the last three decades, chicken consumption in Canada has dramatically increased due to the country's population growth, the demand for non red meat products (i.e. poultry and fish products), health awareness and perceived health benefits of poultry meat (i.e. chicken, turkey, duck and goose), and continuing consumer preference for convenient and creative value-added chicken products which reduce meal preparation time (AAFC, 2007; Goddard *et al.,* 2007). The Canadian poultry industry has shifted its operations towards more convenient products in response to consumers' concerns (AAFC, 2007).

The Canadian poultry industry is composed primarily of broiler chickens and turkeys (Classen & Schwean, 1998) and as of 2006 consisted of 175 primary

processing plants (AAFC, 2009). Of these, Flamingo Foods (Cooperative Fédérée de Quebec), Lilydale Poultry Co-operative, Maple Leaf Poultry, Exceldor and Maple Lodge Farms are the five largest companies (AAFC, 2007). Among other industrialized countries, Canada is considered one of the fifteen major poultry producing and consuming countries throughout the world (FAO, 2008). In 2006, Canada ranked as the world's twelfth largest chicken producer with 981.2 million kilograms worth CAD$1.82 billion, which represents 1.6% of the world's production (The poultry site.com, 2007; AAFC, 2009).

Canadian per capita chicken consumption continues to grow (Fig. 1.1). In 2007, per capita chicken consumption was estimated at 31.9 kg (CFC, 2008). According to "Canadian Food Trends to 2020", the demand for poultry products is expected to increase by 36% by the year 2020 (AAFC, 2005).

Chicken is sold in a variety of forms. In 2007, fresh chicken products accounted for 75% of the retail market while processed chicken products such as nuggets and frozen dinners accounted for 22% and cooked chicken for 3% (Gooch, 2009).

1.3 Factors Driving Food Choice Trends

"Food choice is not merely about obtaining nutrition" (Richardson *et al*., 1994). Demographic changes, convenience and price, the importance of variety and new experiences, quality and health concerns, and ethical and environmental issues; are some of the most important determinants of food choice today and challenges to satisfying consumers' demands (McCarthy *et al.*, 2004; Costa & Jongen, 2006; Grunert, 2006; Costa *et al.,* 2007). Our eating habits are changing; more people are spending less time planning and preparing their meals and are shifting towards prepared meals and take out (Linneman *et al.*, 2006).

1.3.1 Lifestyles and Convenience

Grunert (2006) defined lifestyle as "an effort to adapt our behaviour to achieve the same basic values throughout our life, even though the environment in which we live is constantly changing".

Lifestyles have changed over the last decade. Globalization, the decrease in the average household size, the ageing population, women's participation in the work force, longer work shifts (lack of time), higher incomes and increased multiculturalism have all affected consumer demands for all types of goods and have led to a rapid growth of convenience products, especially in industrialized countries. Most of the time, these products offer consumers inexpensive and relatively tasty "meal solutions" that require little or no prior preparation (Tillotson, 2003; de Boer *et al*, 2004). According to a study conducted by the Canadian Foundation of Dietetic Research (CFDR, 1997), convenience products in Canada represent a way to reduce shopping and meal preparation. Johnson-Down and others (2006) found that people aged 18 to 34 years all across Canada reported eating more prepared and convenience foods than people aged 35 to 65 years.

1.3.2 Quality Cues and Quality Attributes

For a product to be purchased, it must satisfy consumers' needs (Gutman, 1982). People purchase products for various reasons. These reasons are mainly influenced by the physical product attributes as well as the process attributes, which in sum constitute what consumers consider as quality attributes (Northen, 2000; Linnemann *et al*., 2006).

The definition of quality and its evaluation has been one of the most challenging areas in the study of marketing and consumer behaviour (Ophuis & Van Trijp, 1995; Grunert, 1997). For some authors, quality can be defined in a simple way as "consumer acceptance" (Moskowitz, 1995) which is influenced by individual personal quality standards and is situation dependant (Moskowitz, 1995; Becker, 2000). However, according to Becker (2000), the most popular definition of quality is "the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs" stated by the International Organization of Standardization (ISO 8402).

The "perceived quality" approach is used to analyze product quality from the consumer's perspective (Northen, 2000). Perceived quality is a very important concept related to consumer's motivation to purchase a particular product and product satisfaction (Ophuis & Van Trijp, 1995; Issanchou, 1996).

In 1989, Steenkamp and van Trijp suggested a model of the quality perception process. This process is based on the idea that consumers' quality perceptions of a product are formed prior to consumption by the evaluation of quality indicators known as quality cues. These quality cues can be divided into intrinsic and extrinsic quality cues (Ophuis & Van Trijp, 1995; Issanchou, 1996; Poulsen *et al*., 1996; Northen, 2000; Bredahl, 2003; Grunert, 2006; Linnemann *et al*., 2006).

Intrinsic quality cues can be measured in an objective way and are related to physical product characteristics such as taste, appearance, shape, color, texture, freshness, nutritional value, safety and even shelf life (Ophuis & Van Trijp, 1995; Issanchou, 1996; Brehdal *et al*., 1998; Northen, 2000; Grunert, 2006; Linnemann *et al*., 2006). Extrinsic quality cues are related to the product but are physically not part of it, such as price, brand, packaging, functional attributes including factors such as 'convenience or preparation' and communicated information like composition of nutrients, organic or animal welfare production methods (Ophuis & Van Trijp, 1995; Brehdal *et al*., 1998; Northen, 2000; Brehdal, 2003; Grunert, 2006; Linnemann *et al*., 2006). The combination of all these quality cues is used by the consumer to "form beliefs about quality attributes" or in other words, to predict quality attributes (Issanchou, 1996; Northen, 2000).

Other attributes related to quality and associated with consumers assessment of a product during the purchasing process were identified by Nelson (1970) and Darby and Karni (1973). Nelson (1970) distinguished between "search" and "experience" attributes. Search attributes are those that can be verified through direct inspection while experience attributes are related to those characteristics that cannot be determined prior to purchase, but can be detected during consumption. Examples of experience attributes are taste, freshness and

convenience. Darby and Karni (1973), on the other hand, contributed to this idea by identifying credence attributes. Credence attributes such as safety and healthiness cannot be detected prior to purchase or during consumption but are determined over time (Ophuis & Van Trijp, 1995; Northen, 2000; Srinivasan & Till, 2002; Brehdal *et al*., 2003).

1.4 Consumer's Meat Attitudes and Preferences

Numerous approaches based on Steenkamp and van Trijp's quality perception model have been used to analyze consumer quality perception and decision-making in the food sector (Bernués *et al*., 2003; Grunert *et al*., 2004).

In the meat sector, meat consumption, as well as consumer behavior and attitudes towards meat have been investigated. Perhaps the major reasons for this increased interest lie in notable changes in consumers' taste preferences, health concerns, consecutive safety crises, as well as the negative publicity that affects this sector (Verbeke & Viaene, 1999; Bernabéu & Tendero, 2005; Krystallis *et al*., 2007).

With respect to these studies, many authors have examined the factors that influence consumers' decisions either to consume or to avoid meat. Consumers are increasingly more demanding about product quality and are giving more importance to extrinsic characteristics such as processing and credence quality attributes such as safety, health, convenience, local production, ethical factors and environmental beliefs (Issanchou, 1996; Holm & Møhl, 2000; Lea & Worsley, 2001; Berndsen & van der Pligt, 2004; Bernués *et al*., 2003; McCarthy *et al*., 2004; de Boer *et al*., 2007).

1.4.1 European Consumers

Meat has traditionally played a significant role in the Western diet (Kubberød *et al*., 2002; Krystallis *et al*., 2007). However, during the past decades, new attitudes towards meat have been reported in different European countries.

Gender preferences are one of the most important factors driving meat consumption in Europe. Kubberød and others (2002) studied UK women and men preferences towards meat products. Females prefer the "whiteness", "tenderness" and "lightness" of chicken while males prefer the "odours/flavour", "color intensity" and "hardness" of red meats Similar results were reported in Denmark (Holm & Møhl, 2000) and in the Netherlands (de Boer *et al*., 2007).

Age was also found to be an important factor influencing meat consumption. De Boer and others' (2007) study found for example that older consumers prefer white meats in the Netherlands in contrast to older Greek consumers who prefer red meats as "visual meat quality" was of the highest importance (Krystallis *et al.,* 2007).

Other influential factors include cultural perceptions of meat quality and in some cases the relationship between meat quality and social events. In a study conducted by Richardson et al., (2004), British consumers avoid meats that are perceived to be "meat-like" such as beef, lamb, pork and bacon and prefer chicken, fish, burgers and sausages, which are not considered as meat or "edible flesh of animals" (. For Danish consumers, beef and lamb are considered the best of meats and are associated with the upper classes while pork and chicken are associated with low quality and therefore considered for inferior classes (Holm & Møhl, 2000). Belgians associate pork with low quality as well as bad taste and fat content, thus it is considered unhealthy (Verbeke & Viaene, 1999), in contrast to Germans who perceive pork meat as healthy, tasty, fresh, juicy and tender (Bredahl *et al.,* 1998) and Irish who consider pork as safe as poultry (McCarthy *et al*., 2004).

With regards to extrinsic meat attributes, Irish consumers give better value to poultry as it is less costly than beef and pork (McCarthy *et al*., 2004). British, Italians, French and Spanish consumers reported extrinsic attributes of meats such as origin of the meat, animal feeding and storage, freshness and hygiene as important factors motivating meat purchase (Bernués, *et al.,* 2003).

1.4.2 Australian Consumers

Australians have also shown new attitudes towards meat with a gradual decrease in the consumption of red meats, especially beef (Gatfield, 2006). Few studies have been conducted to investigate Australian consumers' perception of meat and influences on meat consumption.

In a study conducted to investigate older consumers' perceptions of meat, Russell & Cox (2003) found that females tend to discriminate meat products according to the level of processing, chemical content, nutritional value, healthiness, ease of digestion and utility while males tend to discriminate according to sensory appeal, fat content, utility and healthiness. They also found that unprocessed red meats were associated with healthy products, and fish and white meats were perceived as lean with high nutritional value.

Lea & Worsley (2001) found that women were more health conscious than men, who in contrast were more influenced by their friends and their beliefs. They also found that older people were less concerned about health and believed that meat was not fattening or a cause of heart disease; therefore, older consumers perceived meat to be necessary in their diets.

In a second study, Russell & Cox (2004) showed that the three different age groups shared some similarities in the way they perceived meat and meat products. For instance, the middle-age group and younger group shared many perceptions regarding health values. For them, white meats and fish were perceived as "healthy" in contrast to lamb chops, pork chops and beef sausage which were perceived as "unhealthy" and "fatty". On the other hand, middle-aged and older consumers were found to be very picky with regard to chemical additives, an important attribute for discriminating among meat products. In summary, Australians use attributes such as nutrition, quality, utility and health to discriminate among meat products.

1.4.3 North American Consumers

Research regarding North America consumer preferences for meat products has primarily focused on meat as a commodity while relatively less attention has been given to the study of the most important factors driving meat consumption from a consumer point of view. Several studies have been conducted to assess domestic disappearance, consumption patterns and consumer demands for meats from an economic and social perspective (Hassan & Johnson, 1984; Reynolds & Goddard, 1991; Chen & Veeman, 1991; Peng *et al.,* 2004) while other researchers have focused their attention on consumer perceptions of food safety or consumer acceptance of meat products developed by new production or processing technologies (Fanatico *et al.,* 2007; Henson *et al.,* 2007). For instance, Bernard and others (2005) investigated American consumer attitudes towards labelling, health risk concerns and knowledge of 5 potential attributes for chicken: free-range, treated with antibiotics, irradiated, fed GM feed, and GM chicken. Results showed that consumers were in favour of labelling all attributes as they perceived a high health risk from many of them. The authors found that most respondents had low self-reported knowledge of many of the studied attributes. Lee and other (2008) on the other hand, investigated the overall quality and identified relevant sensory attributes driving American consumer liking of commercial broiler breast meat produced with different processing practices. Consumers perceived air-chilled products to be moderately tender but slightly less tender than water-chilled products. Texture attributes drove consumer overall liking of commercial broiler breast meat products.

Among the research studies which have focused on consumer preferences and attitudes towards meat products, Anderson and Shugan (1991) found that in the US, convenience had a significant influence on increasing consumer demand for poultry products over red meats as poultry adapts better to high-convenience forms, it retains its flavour when it is microwaved or frozen and it is relatively inexpensive compared to red meat products. On the other hand, freshness, food safety, locally produced, tenderness and reasonably priced were rated as the most

important attributes affecting American meat purchasing choices (Smith & Middleton, 2008). Innes & Cranfield (2009) found that the use of antibiotics and the type of animal housing (conventional space, double conventional space, and free-range), followed by price and brand were the most important production attributes that affect Canadian consumer acceptance of meat products.

"The acceptance of meats is unique to different countries or cultures" (Muñoz, 1998). Although there are many similarities between American and Canadian consumers, there is still to much work to do to understand Canadian consumer perceptions and attitudes towards meat products from a consumer perspective. In the end, bringing quality attributes demanded by the consumer will allow many meat industries to stay in business (Bernués *et al.,* 2003).

1.5 The Need for Consumer-driven New Product Development

Whether for new value-added products, or an improvement or a reformulation of an existing product, new product development (NPD) is necessary for business growth and survival as a strategy to provide companies with competitive tools for success in today's market (Stewart-Knox & Mitchell, 2003; Moskowitz *et al.,* 2006; van Kleef, 2006; Moskowitz & Hartmann, 2008). NPD is risky, costly, and time consuming (van Kleef, 2006). However, despite extensive literature on process optimization for developing new products, truly new products are rare (2.2% of the total launches) and it is estimated that the majority of the "new" food products (80 to 90%) fail within one year of introduction into the marketplace (Stewart-Knox & Mitchell, 2003; Costa & Jongen, 2006; Linnemann *et a*l., 2006; Lundahl, 2006).

Understanding consumer needs and preferences is vital in any commercial context, such as product positioning, marketing or new product development (Gains, 1994; Sijtsema *et al.,* 2004; van den Heuvel, *et al.,* 2007). Identification of consumer relevant quality attributes is fundamental in the design of food products which will be accepted by the consumer regardless of the competition (Ophuis & Van Trijp, 1995; Poulsen *et al.,* 1996; Bredahl *et al.,* 1998; Sijtsema *et al.,* 2004;

Costa & Jongen, 2006; Olsen *et al*., 2008). "Ultimately, the success of a product depends on the consumer's acceptance" (Muñoz, 1998) or how well the new product satisfies consumer demands (van Kleef *et al.,* 2005; Sijtsema *et al.,* 2004; Linnemann *et al.,* 2006, Lundahl, 2006).

Today, although some authors believe consumers are not able to express their needs (Moskowitz & Hartmann, 2008), the importance of listening to the "voice of the consumer" in order to develop successful new food products has become common knowledge (van Kleef *et al.,* 2005; van Kleef, 2006). "A thorough understanding of customers' needs and wants, the competitive situation and the nature of the market is an essential component of new product success" (Cooper, 1994).

. In a consumer-driven approach, market research and consumer research should be done in the initial step of opportunity identification or idea generation (Cooper, 1994; van Kleef *et al.,* 2005) to identify the specific attributes of a new food product (Linnemann *et al*., 2006). Sometimes consumers will not be able to express their needs, however, it is important to understand consumers' perceptions and preferences and therefore, understand how they make product choices (Muñoz, 1998; van Kleef *et al.,* 2005). "Constant and continuing consumer contact remains essential" till the end of the NPD process in order to achieve consumers' product acceptance (Cooper, 1994; van Kleef, 2006).

1.6 Consumer Research: Understanding Consumers Needs

Van Kleef (2006) argued that even though incorporating the "voice of the consumer" during the early stages of NPD has been identified as critical for success, this step is often ignored or unsuccessfully achieved probably due to limited knowledge of available consumer research methods

Consumer perceptions and preferences for food products can be investigated through qualitative and quantitative studies. Qualitative studies are descriptive and involve small numbers of participants. They aim to understand psychological factors that motivate consumer attitudes, beliefs, behaviours, habits,

opinions and perceptions (Muñoz, 1998; Resurrección, 1998; Easwaran & Singh, 2006) and therefore, can be used to identify new product opportunities and generate ideas (Lawless & Heymann, 1998). The most common qualitative technique is the "focus group" a group of 8-12 consumers discussing a product or predetermined topic with the direction of a skilled moderator who coordinates and organizes the study. Normally, focus groups are used to investigate respondents' opinion and perceptions of a particular product or concept (Lawless & Heymann, 1998; Resurrección, 1998; van Kleef *et al.,* 2005; Raz *et al*., 2008). However, there are other qualitative techniques such as in depth interviews, one-on-one interviews, free-choice methods, cognitive maps and structured questionnaires (close-ended questions) also designed to elicit spontaneous information about product attributes, and to measure attitudes and beliefs (McEwan & Thomson, 1989; Scriven *et al*., 1989; Easwaran & Singh, 2006). In all cases, participants are recruited to represent a target population (Moskowitz *et al*., 2006).

Quantitative studies involve above 50 individuals and are conducted to collect data that can be statistically analyzed to quantify consumer responses to the attributes that determine a product's acceptance or preference and sometimes evaluate consumers' preference in greater depth by estimating purchase intent (Muñoz, 1998; Moskowitz *et al*., 2006).

In general, successful NPD requires a balance between both qualitative and quantitative research (van Kleef, 2006), beginning with qualitative research to explore and understand consumers' needs and expectations and ending with quantitative research to validate or quantify the findings and extrapolate them to a larger population (Resurrección, 1998; Easwaran & Singh, 2006; van Kleef, 2006). Both tools have advantages and limitations and even if they complement each other, the decision to use a qualitative technique and/or a quantitative one is normally based on the suitability of the method for obtaining answers for specific research questions (Lawless & Heymann, 1998; Easwaran & Singh, 2006).

1.6.1 Repertory Grid Method

The repertory grid method (RGM) is basically a qualitative method, a semi-structured technique which is often applied in consumer and market research. The RGM is part of George Kelly's (1955) major work "The Psychology of Personal Constructs", a psychological theory that aimed to explain why persons differ from each other in their attitudes, behaviours and views towards events in the world. Therefore, the RGM has been used as method for investigating people's view of their inter-personal world (Fransella *et al.,* 2004). RGM identifies peoples' perceptions by exploring personal constructs (Jankowicz, 2004).

According to Kelly's theory, people make use of their own criteria to understand the world by evaluating, analyzing and developing a personal repertoire of constructs (personal interpretations) of experienced events (Bannister, 1962; Beail, 1985; Gains, 1994). Kelly (1955) defines a construct as a "way in which two things are alike and, in the same way, different from a third". In other words, a construct is our way of discrimination which describes two contrasting poles, e.g. bad-good (Gains, 1994).

The RGM is a form of interview which is conducted face to face with a single person and involves five different stages: (1) product or element elicitation, (2) descriptor or construct elicitation, (3) element comparison (grid completion), (4) data analysis and (5) interpretation of results (Jankowicz, 2004; Beail, 2005; Jaeger *et al.,* 2005).

In practice the Repertory Grid procedure works as follows. Original elements or elements written on separate cards are randomly arranged into groups of three (triads). Each element or card appears in at least one triad and one product or card from a triad will be carried over to the next triad (Gains, 1994). Each triad is presented to the participant who is asked to select the two elements that are similar in some way and different form the third. Questions such as "In what important way are two of these products alike and thus different from the third?" and then "In what way does the third product differ from the other two?" can be

used for this purpose (Beail, 1985). However, it is possible to guide the participant into producing constructs that relate to a specific research question (Jaeger *et al.,* 2005). This design allows the participants to elicit common as well as opposite constructs. Once all possible constructs are elicited from that triad and the participant is no longer able to think of a new construct, the participant is presented with the next triad and the process is repeated until all elements had been included (Thomson & McEwan, 1988; Gains, 1994; Jankowicz, 2004).

Once the participant has elicited all possible constructs, each element is rated on a 5-point Likert scale (Jankowicz, 2004) on each personal construct resulting in a matrix of scores in the form of an element by construct grid (Thomson & McEwan, 1988; Gains, 1994; Russell & Cox, 2003, 2004). Individual grids are then analyzed and compared using a least squares statistical procedure known as Generalized Procrustes Analysis (GPA) which involves mathematical transformations (i.e., translation, rotation, reflection, isotropic rescaling) of individual data matrices to provide a map that describes the important perceptual constructs common to most people in a multidimensional space (Thomson & McEwan, 1988; McEwan & Thomson, 1989; Russell & Cox, 2003, 2004, Xiong, 2008).

In recent years, George Kelly's repertory grid method has been used both on its own and partnered with quantitative research methods (Iop *et al.,* 2006). In addition, the RGM was suggested as being superior to other qualitative research methods as it eliminates problems associated with limited response options, dominant discussion group members and interviewer bias as participants are allowed to use their own specific constructs (Hughes, 1974; Piggot and Watson, 1992; Gains, 1994).

The RGM has been used in a number of applications to elicit information about consumer perceptions of foods. It has been applied in general food research including fruits (Jack *et al*., 1997; Jack *et al*., 1998; Jaeger *et al*., 2005; Carbonell *et al*., 2007), vegetables (Baxter *et al*., 1997; Baxter *et al*., 2000), meat products (Thomson & McEwan, 1988; Russell & Cox, 2003, 2004), chocolate (McEwan &

Thomson, 1989), alcoholic beverages (Scriven *et al.,* 1989; Gains & Thomson, 1990), bread (Hersleth *et al*., 2005) and milk products (Raats & Shepherd, 1991/92, 1993; Saba & Rosati, 2002; Gonzalez & Costell, 2006).

1.6.2 Conjoint Analysis

Conjoint analysis (CA) is a quantitative research technique developed in the field of psychology to evaluate consumers' trade-offs among multi-attribute alternatives (Green & Srinivasan, 1978; Green & Srinivasan, 1990; Walley *et al.,* 1999). CA is a powerful statistical tool frequently used in marketing research for explaining and predicting consumer preferences for product characteristics (Green & Srinivasan, 1978; Cattin & Wittink, 1982; Harrison *et al.,* 1998), for identifying product attributes that drive consumers interests or purchasing decisions (Moskowitz, 2001; Lee *et al*., 2007; Harrison *et al.,* 1998), for identifying new products or concepts (Cattin & Wittink, 1982), for identifying market segments (Easwaran & Singh, 2006) and for finding the best price for a particular product or consumers' willingness to pay for a certain product (Boughanmi *et al.*, 2007; Gustaffson *et al.,* 2007).

Also called "trade-off" analysis, this procedure is based on the idea that consumers evaluate the value of a product based on various factors or attributes that are "considered conjointly" (Walley *et al*., 1999). Consumers attach a particular value (utility) to each of a product's attributes and are willing to trade-off product attributes with less utility to gain product attributes with higher utilities to optimise product utility (Easwaran & Singh, 2006). Thus, CA estimates the value or importance of specific product attributes (part-worths) based on consumers' overall preference (total-worth) for combinations of these attributes when respondents are asked to evaluate these attributes in a series of product concepts as they would during a real purchase situation (Walley *et al*, 1999; Gustaffson *et al.,* 2007). CA is a tool used to design products that possess attributes valuable to consumers (Boughanmi *et al.*, 2007; Haddad *et al.*, 2007).

Designing a conjoint study involves four basic steps (Moskowitz *et al.*, 2004; Boughanmi *et al.*, 2007). The first step is the identification of attributes and

attributes levels that are important to consumers and that should be incorporated into the analysis. This can be done through numerous qualitative research techniques such as focus groups, in-depth interviews, repertory grid method, free-elicitation methods, or based upon relevant literature review (Green & Srinivasan, 1978; Cattin & Wittink, 1982; Walley *et al.*, 1999; Boughanmi *et al.,* 2007).

After the attributes and their levels have been selected, an experimental design combines the attributes and their levels into hypothetical product profiles (concepts) that will be presented to consumers for their evaluation. A "complete factorial design" allows respondents to evaluate all the possible concept combinations (Gustaffson *et al.*, 2007) however, applying such a study can be costly, time consuming and result in participant confusion and fatigue (Green & Srinivasan, 1978; Walley *et al.,* 1999; Boughanmi *et al*., 2007). Therefore, a "fractional factorial design" is often preferred as it represents the complete factorial design using a smaller number of concepts (Gustaffson *et al.,* 2007). The easiest way to reduce the number of concepts (random sampling) is to randomly select a set of concepts from all possible concepts. However, the most common method (orthogonal array) is to generate a subset of all possible concepts to estimate the main effect for each attribute level while keeping the analysis statistically reliable (Walley *et al.,* 1999; Boughanmi *et al.,* 2007; Gustaffson *et al.,* 2007).

The third step is selection of the data collection method; the way in which the concepts will be presented for evaluation (Gustaffson *et al.,* 2007). There are two types of data collection procedures: "full profile" or "paired comparisons". In the full profile method, respondents are presented with complete product concepts commonly shown on product information sheets or separate cards using descriptive or explanatory sentences (Green & Srinivasan, 1978; Gustaffson *et al.,* 2007), and are asked to rate or rank the concepts (Walley *et al.,* 1999; Moskowitz, 2001). Stimuli may also be presented using photographs, cartoons or drawings, real products or product prototypes (Green & Srinivasan, 1978; Walley *et al.,* 1999; Gustaffson *et al*., 2007). In the paired comparison technique, respondents

are presented with pairs of competing concepts and asked to choose the preferred option (Walley *et al.,* 1999; Moskowitz, 2001). According to Ness & Gerhardy (1994) and Walley *et al.* (1999), the most preferable data collection procedure is the full profile method as it implies less calculation and because paired comparisons are not as realistic as the full profile method. However, as the number of concepts increases it becomes unfeasible for respondents to make decisions (Iop *et al.,* 2006; Gustaffson *et al.,* 2007). Therefore, it is suggested that the full profile method should only be used when six or less attributes and 3 or 4 levels of attributes are involved in the study (Green & Srinivasan, 1978; Green & Srinivasan, 1990; Iop *et al.,* 2006).

The last step is the estimation of the part-worth utilities for all levels of product attributes. These utility scores provide a quantitative estimation of the preference for each product level. Several estimation techniques (conjoint models) can be used to analyze the data including Linear Programming Technique for Multidimensional Analysis of Preference (LINMAP) and Multivariate Analysis of Variance (MANOVA). According to Cattin & Wittink (1982) the most commonly used estimation technique is the Ordinary Least Squares (OLS) regression analysis (Louviere *et al.,* 2005; Gustaffson *et al.,* 2007; Boughanmi *et al.,* 2007) as this method is used for estimating the parameters (unknown values) of a multiple regression analysis (Wooldridge, 2006). In this particular case, OLS can be used to study the relationship between a single dependent variable (e.g., the overall preference) and various independent variables (e.g. the level of attributes).

1.6.3 Willingness to Pay (WTP) Estimation

From an economic point of view, willingness to pay (WTP) is "the maximum amount that a buyer will pay for a good" and measures how much that individual values the product (Mankiw, 1998). An adequate knowledge of consumers' WTP for a particular product is of great value to food producers and marketers for developing new products, adopting an optimal pricing strategy for

increasing product profitability and for forecasting market response to price changes (Breidert *et al.,* 2006).

There are several methods for measuring WTP which can be classified into actual or simulated price response data (revealed preferences) and survey techniques (stated preferences) (Wertenbroch & Skiera, 2002; Breidert *et al.,* 2006). Revealed preferences are estimated by analyzing observed market data or by analyzing consumers' purchase behaviours by providing participants with an amount of money which they can spend on a certain selection of products (Breidert *et al.,* 2006). In contrast, stated preferences are estimated by directly asking participants how much they are willing to pay for a particular product (direct surveys) or by presenting participants with product concepts with varied prices and asking them to indicate whether they would purchase the product at the given price (indirect surveys) (Wertenbroch & Skiera, 2002; Breidert *et al.,* 2006).

The selection of a WTP method depends on time and cost as well as the advantages and limitations of each method (Breidert *et al.,* 2006). An advantage of survey data is that they can be used for concept testing and NPD, or even in evaluations of public goods such as environmental or natural resources preservation (Wertenbroch & Skiera, 2002).

1.6.3.1 Contingent Valuation Method

Originally proposed in 1940's and developed by economist Robert K. Davis in the early 1960s, the contingent valuation method (CVM) is a survey-based technique (stated preference method) used to estimate consumers' WTP in dollar amounts for a specific public good (Mitchell & Carson, 1989). Although the CVM approach is commonly used to elicit consumer WTP for non-market commodities, this hypothetical market technique can also be employed for commodities available for sale such as factors that influence food demand (FAO, 2000; Moon & Balasubramanian, 2003; Howard & Allen, 2007). This method is called "contingent" because personal elicited WTP values are obtained contingent (conditional) upon a particular hypothetical market described (Mitchell & Carson,

1989). In other words, it provides a means of eliciting the price that an individual would pay *if* the market did exist.

A CVM study can be conducted through in-person interviews which generally derive higher quality WTP estimations than mail surveys, internet surveys or telephone surveys (FAO,2003)

A contingent valuation survey consists of three basic parts:

1. A detailed description (scenario) of the good to be valued and the hypothetical circumstances (baseline conditions) under which it is offered to the respondent
2. Questions which elicit respondents' WTP for the good being valued
3. Socio-economic and demographic questions to estimate response validity and reliability.

There are several WTP elicitation techniques used in contingent valuation surveys. Common techniques include open-ended (direct) questions where respondents are asked directly for their maximum WTP for the good being valued; the bidding game, where respondents are asked to state a price for the good; and the payment card, where respondents are provided with a card which contains different potential WTP amounts and they indicate the highest amount they would be willing to pay (Mitchell & Carson, 1989). Among these methods dichotomous (discrete choice) is widely used (Ahmed, 2006).

The dichotomous technique, also referred to as 'single-bounded dichotomous choice' or 'close-ended questioning', can be conducted by telephone, mail or in person. In this technique respondents state whether or not they would be willing to pay $X to obtain a good (Cameron & James, 1987; FAO, 2003). The hypothetical amount (the bid or premium price) is varied across respondents (FAO, 2003). This approach requires a large number of respondents as the valuation information gained is diffuse. However, this elicitation format is widely used as it imitates realistic purchasing behaviours (Cameron & James, 1987) or yes/no voting situations (Vossler & McKee, 2006), it is easy to respond (Hanemann *et al.,* 1991) and it is seems to be well-suited for eliciting consumers' true preference (Li & Mattsson, 1995). With this approach, consumers' WTP is

not observed directly but can be inferred using statistical econometric models such as logit or probit regressions. These models provide an estimate of the probability of accepting a premium price as a function of the price value and other factors such as social demographic explanatory variables (Pinto *et al.,* 2001). In addition, these models provide a means to estimate consumers' mean WTP based on Hanemanns' (1984) random utility maximization (RUM) approach which was extended from McFadden's (1973) random utility maximization (RUM) model. This approach supposes that consumers obtain utility from the attributes of the products under valuation and assumes that some factors of these utilities are unknown or unobservable and therefore considered random or stochastic (Ureña *et al.,* 2007). According to Gil and others, (2000) "by assuming a linear utility function and a logistic distribution function for the binary question", consumers' WTP can be estimated using the following equation:

$$\text{Logit}\,(p) = \log_e (p/1\text{-}p) = \beta 0 + \beta_1 X_1 = p = 1/1+e^{-(\beta_0+\beta_1 X_1)} \qquad (1)$$

where (p) is the probability of occurrence, the log odd or $\log_e (p/1\text{-}p)$ is a linear function of the estimated parameters, β_0 and β_1 are the equation coefficients to be estimated and X_1 denotes the full set of explanatory variables such as the 10 premium prices offered to consumers. Therefore, the WTP mean can be estimated using the following expression:

$$E\,(WTP) = \int_0^{\infty} 1/1+e^{-(\beta_0+\beta_1 X_1)}\,\delta X = \beta_0/\beta_1 \qquad (2)$$

where β_0 represents the constant and β_1 the explaining variable in the estimated econometric (logit) model.

Because of the nonlinear nature of equation (1), the logistic regression parameters (β_0 and β_1) are estimated by Maximum Likelihood Method (MLM) and not by ordinary least squares (OLS). The MLM estimates the parameters that

maximize the probability (likelihood) of observing the actual data (Wooldridge, 2006).

1.7 Previous Research Limitations

Previous consumer studies (Hassan & Johnson, 1984; Reynolds & Goddard, 1991) and more recently Goddard *et al.,* (2007) have examined Canadian meat demand from an economic, social or demographic perspective. Other studies, such as the national telephone survey "Usage and Attitude" conducted every three years by Chicken Farmers of Canada (CFC), have focused on consumer behaviours towards chicken consumption with the aim of keeping "Canadians informed and confident in the chicken they eat" (CFC, 2008).

To the knowledge of the author, no recent Canadian research has been conducted to understand consumer attitudes and beliefs towards meat products as well to identify the factors influencing consumer preferences for chicken products. Therefore, it is important that research be conducted to generate insight into consumer needs to enhance the acceptance of future new poultry product development by translating consumer demands into product specifications.

1.8 Research Proposal

The goal of this research study is to provide the Canadian poultry industry with insight into consumer oriented value-added chicken product development. Qualitative and quantitative research methods will be used to develop an understanding of how consumers perceive poultry products amongst their different meat alternatives, as well as to identify important product attributes affecting consumer preferences for value-added chicken products and to assess consumers' WTP for value-added product concepts.

The **objectives** of the proposed research are to:

1. Identify consumer attributes for discriminating poultry products among other meat products by applying the Repertory Grid Method (Chapter 2).

2. Identify product attributes that affect consumer preference for value-added chicken products and determine the optimum product profile through a Conjoint Analysis (Chapter 3).
3. Estimate consumers' WTP for value-added chicken attributes using a dichotomous choice model (Chapter 3).

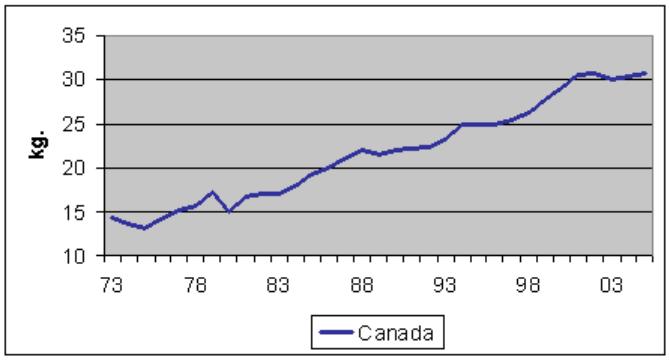

Figure 1.1 Per-capita consumption of chicken in Canada – 1973-2005 (eviscerated weight) Source: Statistics Canada.

1.9 References

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Chapter 2

Perceptual attributes of poultry and other meat products: A repertory grid application[1]

2.1 Introduction

Currently, Canadian lifestyles dictate more time to leisure activities and less time to home food preparation. Eating habits vary by region but reflect Canada's diversity in economy, ethnicity and lifestyle choices (AAFC, 2005). Canadian consumers are looking for balance among taste, nutrition, health, quality, freshness, convenience and price in their food choices in and outside of the home. In addition, they want to maintain their health through nutrition, and they want easy, fast and affordable options that fit into their busy schedules and changing lifestyles (AAFC, 2005).

Canadians continue to choose chicken meat primarily due to an increase in health awareness and a higher consumer demand for non-red meat products (AAFC, 2006). Consumers prefer chicken for its taste, variety, affordability and convenience (CFC, 2008). The positive perception of chicken may be attributed not to the product itself but as a result of packaging, positioning and the extent of variety of chicken products. Unlike the beef or pork industry, the poultry industry has better responded to the changes in consumer demands by producing value-added products that concentrate on consumers' health and convenience concerns, therefore increasing chicken's popularity (Resurrección, 2003).

In 2007, Canadian per capita chicken consumption was estimated at 31.9 kg (CFC, 2008). From 2007 to 2008, despite increased retail prices, per capita chicken consumption increased by 1% (Grier, 2008) and 8 out of 10 Canadian households bought chicken on a regular basis (Gooch, 2009). According to "Canadian Food Trends to 2020", the demand for poultry products is expected to increase by 36% by the year 2020 (AAFC, 2005).

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During 2007, fresh chicken products account for 74% of the Canadian retail market while frozen processed chicken accounted for 22% and cooked chicken for 3% (Gooch, 2009). The increased demand for poultry products is coming from processed products evidenced by the growth of home meal replacements or ready to eat products, "which add value by offering consumers convenience in meal preparation" (Goddard *et al.,* 2007).

Understanding consumer perceptions of food and consumer needs is fundamental for food producers in any commercial context, such as new product development, product positioning and marketing (Ophuis & van Trijp, 1995; van Kleef, van Trijp & Luning, 2005). In order to design products which will be accepted by consumers, it is important to identify consumer relevant quality attributes and translate consumer demands into product specifications that are feasible from the producer's point of view (Ophuis & Van Trijp, 1995). Much of the research regarding meat products in Canada attempts to understand consumers' behaviours and quantify their preferences. However, by understanding consumers' needs and wants, the Canadian poultry industry will continue growing by designing superior value-added products in response to consumers' preferences and with better opportunities regardless of the competition.

A wide variety of consumer research procedures available for product development purposes exist which can provide consumer information related to the perception and preference resulting associated with the consumption of food products (McEwan & Thomson, 1989; van Kleef *et al.,* 2005). These include focus groups, personal interviews and surveys that can be used to evaluate consumers' attitudes and beliefs towards any kind of product (Hughes, 1974; van Kleef *et al.,* 2005).

The repertory grid method (RGM) is a qualitative mapping technique applied in consumer and market research to investigate perceptions of food products. This technique is based on George Kelly's (1955) theory of personal constructs psychology and involves the comparison of products presented in

groups of three in one-on-one interviews. Consumer perceptions are directly derived by asking the participants to describe in a short sentence how two of the products are alike and different from the third. Subsequently, the participants quantitatively rate the products according to their own constructs (attributes) (Thomson & McEwan, 1988; Russell & Cox, 2003, 2004). Data derived from one-on-one interviews are analyzed via Generalized Procrustes Analysis (GPA) (Gower, 1975), a popular statistical procedure which combines data from different individual participants and generates a multidimensional space product map that describes the important perceptual attributes common to most people (Thomson & McEwan, 1988; McEwan & Thomson, 1989; Russell & Cox, 2004). RGM aids the representation of the ways a consumer perceives products, thus, it is suitable for understanding what is relevant from the consumer's point of view and therefore for understanding attitudes and beliefs (Jaeger & Meiselman, 2004; Russell & Cox, 2004).

RGM has been used successfully in a wide range of applications such as marketing, business and education (Jankowicz, 2004). This procedure has also been applied in food and consumer research including fruits (Jack *et al.,* 1997; Jack *et al.,* 1998; Jaeger *et al.,* 2005; Carbonell *et al.,* 2007), vegetables (Baxter, *et al.,* 1998; Baxter *et al.,* 2000), meat products (Thomson & McEwan, 1988; Russell & Cox, 2003, 2004), chocolate (McEwan & Thomson, 1989), alcoholic beverages (Scriven *et al.,* 1989; Piggot & Watson, 1990; Gains & Thomson, 1990), bread (Hersleth *et al.,* 2005) and dairy products (Raats & Shepherd, 1991/92, 1993; Saba & Rosati, 2002; Gonzalez & Costell, 2006).

The objective of this study was to apply the Repertory Grid as a method to identify consumer attributes for discriminating poultry products among other meat products with the ultimate aim of generating insight into consumer driven product development of value-added chicken products.

2.2 Materials and Methods

This project was approved by the University of Alberta's Faculty of Agricultural, Life, and Environmental Sciences Research Ethics Board.

2.2.1 Participant Recruitment

Twenty seven volunteer participants were recruited from a local farmers' market, grocery stores and the University of Alberta campus in Edmonton, AB, Canada. Snowball sampling was also used as a recruitment method. Inclusion criteria for the study were consumption of chicken or chicken products at least once a month and at least one dependant under 18 years old in the home. Participants were not chosen to represent a particular socio-economic group. The sample size used (N=27) is comparable with previous studies using the RGM (McEwan & Thomson, 1989; Scriven *et al.*, 1989; Gains & Thomson, 1990; Jaeger & Meiselman, 2004; Hersleth *et al*, 2005). Each participant was compensated with a $25 gift card.

2.2.2 Products

Twenty four red and white meat products including eggs were chosen for the study as they were considered to be the most popular or representative meat products consumed in Canada (Table 2.1). Constructs were elicited using the names of the selected meat products printed on separate white cards, one name per card.

2.3. Triad Formation

Twenty four cards were arranged into a series of twelve triads (twelve groups of three cards which could be used more than once); and presented to each participant in a randomized order in a personal interview. The selection procedure for the triads was as described by Thomson and McEwan (1988). The interviews took place in meeting rooms both on and off campus.

2.2.4 Interviews

The interviews consisted of two parts. In the first part, constructs were elicited from the participants by presentation of the twelve triads. When presented with a triad, participants were asked to select the two products that were similar in some way and different form the third. Then they were asked to explain in which way these two products differed from the other. This format was designed to allow participants to elicit common as well as opposite descriptors. Once all possible constructs were elicited from that triad and the participant was no longer able to think of a new descriptor, the participant was presented with the next triad and the process was repeated until the completion of the twelve triads. The information gained was a personal list of constructs that was used in the second part of the interview. During the second part, each participant was asked to rate the 24 meat products using a 1 to 5 "Likert" scale, in which the left side of the scale corresponded to disagree strongly (value 1) and the right side corresponded to agree strongly (value 5).

Following the interview, each participant completed a demographic questionnaire which included questions on education status and self-reported income. The whole session for each participant lasted approximately 1 to 2.5 hours (average 1.5 hours).

2.2.5 Construct Classification

Prior to the data analysis, all the constructs were compiled in the form of separate product by descriptor data matrix (grid). All grids were reviewed and on the basis of each participant's verbal definitions, similar descriptors were grouped together and were given a general name (141 groups in total). When a participant provided more than one construct from the same group after renaming (two different constructs meaning the same), the rating of both constructs was averaged (Russell and Cox, 2004). No group of constructs was eliminated for subsequent analysis.

2.2.6 Data Analysis

Data were analyzed by Generalized Procrustes Analysis (GPA) (Gower, 1975) using Senstools for Windows V3.2 (OP&P, Utrecht, The Netherlands). GPA is the best suited statistical procedure to analyze RGM data as it was developed for comparing different configurations, thus allowing each participant a personal descriptive vocabulary. It uses algebraic steps to summarize the individual configurations, identify trends and produce a consensus configuration of the meat products. This consensus configuration is simplified to a reduced dimensional plot which is described by the constructs significantly correlated with its axes (Dijksterhuis & Punter, 1990; Baxter *et al.*, 1998; Jaeger & Meiselman, 2004; Jaeger *et al.,* 2005). To estimate the significance of the GPA result, a Permutation Test was performed (Monteleone *et al.,* 1997) to determine the probability that the consensus derived from this study could have arisen by chance. To estimate the differences between participants, a Procrustes Analysis of Variance (PANOVA) was performed to determine differences between individual and consensus configurations and differences between meat products.

2.3 Results and Discussion

2.3.1 Repertory Grid Method

2.3.1.1 Participants' Characteristics

Twenty seven consumers, 18 females and 9 males, participated in the study. Participants' ages ranged from 18 to 69 years; 70% of them were between 18 and 39 years old. Many (63%) reported having 3 members in their household with one of them under 18 years of age. The educational status ranged from "some university or college" to "post graduate university degree". Participants were almost evenly distributed across the household income ranges, with the exception of the two highest, which both contained 11% of participants.

Almost half of the interviewed consumers (44%) "always" purchased their meat products at chain supermarkets, while 37% and 30% of the participants respectively purchased meat products "most often" at chain supermarkets or

wholesalers. Only 15% of the consumers "sometimes" purchased their products at meat shops and 19% purchased them "rarely" at the same place.

Chicken, followed by fish and seafood, were the favourite meats among the participants. Chicken breasts followed by thighs and drumsticks were the favourite chicken parts among the participants' households. In general, 48% of the interviewees consumed chicken "2 - 3 times a week" and 37% used fresh chicken "more than 3 times a week" to prepare any meal or snack at home, while 33% used fresh chicken "2 - 3 times a week" for the same purpose. Moreover, all of them preferred chicken cooked at home rather than cooked in-store. The frequency of "ready to eat" chicken purchases was low; 52% of the participants purchased it only "once a month".

2.3.1.2 Construct Elicitation

The number of constructs elicited per participant varied from 16 to 42, with a mean of 29. In total, 743 constructs were classified into one of 141 groups of similar constructs. In spite of the high number of groups, almost all of the participants used similar words to describe healthiness, nutrition, physical, sensory, functionality and ethical attributes for all 24 meat products.

2.3.2 Generalized Procrustes Analysis

2.3.2.1 Participant Agreement

To estimate the agreement among participants, a participant plot (Fig. 2.1) was generated and a PANOVA was performed. In general, participants were distributed along the first dimension and a very good consensus was obtained from almost all of them. However, participants 1 and 6 appeared as outliers most probably as these two participants did not consume pork. Neither were eliminated from subsequent analysis as their correlation data showed no difference from the rest of the participants.

2.3.2.2. Product Agreement

A PANOVA was also performed to determine differences between individual and consensus configurations and differences between meat products. Low residual variances resulted for boneless, skinless chicken breasts (0.45%), ground chicken (0.46%), lamb (0.48%) and sirloin beef steak (0.49%), indicating good agreement among the participants regarding the position of these products. In contrast, pork chops and ham & swiss chicken breast displayed high residual variance (1.35% and 1.08%, respectively), reflecting a lack of agreement among the participants about these products. The maximum amount of the total variance in the consensus configuration was attributed to pork ribs (3.27%), followed by wieners (2.96%), pork chops (2.81%) and cooked ham (2.81%), chicken nuggets (2.62%) and eggs (2.56%). This denotes that these products fit well into the consensus configuration. On the other hand, ground chicken and ground beef accounted for the lowest consensus variance (0.56% and 0.66% respectively). Thus, these products couldn't be described in the process of projection to the first two dimensions of the grid and therefore lie very close to the centre of the consensus configuration (Fig. 2.2). In particular, roast of beef and sirloin beef steak are perceived similarly as they lie very close to each other (1.65 and 1.49% consensus variance respectively). Interestingly, boneless, skinless chicken breasts occupied a very similar position in each participant's configuration resulting in a relatively high consensus variance and low residual variance (2.07 and 0.45 respectively).

2.3.2.3 Consensus Configuration

GPA generated a consensus configuration containing all 24 meat products (Fig. 2.2), where the total amount of variance explained by the first two dimensions was 43.07%. The first dimension accounted for 23.82 % of variance and the second dimension for 19.25% of variance. Further dimensions explained less than 10% of variance and therefore were not considered further (Thomson & McEwan, 1988). According to the Permutation test results, the upper 5% of the

total variance accounted for (TVA) in the permutated data set result was equal to 34.53%, which was less than the TVA in the real data set (48.48%).

The consensus configuration was interpreted by identifying the constructs for each participant which were highly correlated (<-0.7 or > 0.7) with each of the two dimensions (Table 2.2).

In general, highly correlated constructs denote the most important attributes perceived by the participants. However, not all the constructs frequently used by the participants were highly correlated with the two dimensions and not all the highly correlated constructs were used frequently by a great number of participants. “Expensive”, for example, was the most common construct among the interviewees (given 24 times) but resulted in low correlations in all cases as price was not perceived similarly by all participants.

GPA’s first dimension broadly separated the meat products by “processed/artificial vs. health/nutritious” attributes, while the second dimension discriminated the products by “healthy/convenient vs. difficult to digest/messy” attributes (Table 2.2). Along the two dimensions, the products appear to be separated into six different groups (Fig. 2.2).

Correlated with the negative axis of dimension 1, chicken burgers, chicken nuggets, fish sticks, sliced turkey breast, ready to eat chicken, surimi/crab imitation (Group A) and flavoured chicken wings, wieners and ham & swiss chicken (Group B), were differentiated from the rest of the products as they are generally perceived as “processed” or “artificial” with “no control over taste” and with lost benefits (Fig. 2.2). Even though these products are considered to be “good for storing or freezing”, participants have “cooking process concerns” and they “don’t trust the quality or labels” so these products are considered as “junk food” which can be purchased “in fast food courts” or used only “for snacks”. In contrast, correlated with the positive axis of dimension 1, ground beef (Group C) is separated from the rest of the products as it is considered to be “pure meat” with “good appearance” and of “good quality”, as well as “healthier”, with “high nutritional value”, “versatile” and “for BBQ” use.

Groups D and F share the same attributes given for ground beef (Group C) (Fig. 2.2). Correlated with the positive axes of dimensions 1 and 2, eggs, boneless, skinless chicken breasts, boneless, skinless chicken thighs and salmon (Group D), are also perceived as "leaner", "easy to cook", "for main meal" and "convenient". In contrast, whole turkey, roast of beef, sirloin beef steak and lamb chops (Group F) differ from the rest of the products as additionally they are perceived as "difficult to digest", "for special occasions" and participants "don't know how to cook them".

Group C products (canned tuna, chicken breast strips and ground chicken) share some characteristics of Group D: "for main meal", "white meat", "healthier" "leaner", with "high nutritional value", a "good source of protein", "convenient", "versatile" and "easy to cook" but are not considered to have a "good appearance", "good quality", be good "for BBQ" and you can not be "innovative with seasoning" (Fig. 2.2) . Finally, strongly correlated with the negative axis of dimension 2, Group E products (cooked ham, pork ribs and pork chops) are perceived as "difficult to digest", "messy" and only used for "special occasions" as participants "don't know how to cook them". Although Group E products share some characteristics of Group F products, they differ from all products as they do not have any positive attributes.

The results of our study show that attributes describing healthiness, nutrition, convenience, and processing characteristics were consumers' most important parameters for discriminating amongst 24 meat products including eggs. In addition to hedonic and intrinsic quality attributes such as cut, meat colour and fat content, Europeans (Bernués *et al.,* 2003), Australians (Russell & Cox, 2003, 2004) and Canadians also give importance to some extrinsic and credence attributes (Steenkamp & Van Trijp, 1996) to differentiate among products and influence their consumption. In this particular study, examples of important extrinsic attributes are meat processing and "animal welfare concerns"; while examples of credence attributes are health related such as "nutritional value" and convenience or use related attributes such as "easy to cook" or "for

special occasions" (Table 2.2). These findings support previous research on meat consumption where health, social events and ethical beliefs were found to be some of the reasons for eating or avoiding meat products (Holm & Møhl, 2000; Lea & Worsley, 2001; Berndsen & van der Pligt, 2003; McCarthy *et al.,* 2004; de Boer *et al.,* 2007) and are in accordance with the current trends in meat consumption and convenience (Myrland *et al.,* 2000, Resurreción, 2003; Grunert, *et al.,* 2004; Windhorst, 2006; Costa *et al.,* 2007).

In the present study, participants perceived unprocessed meat products more positively than breaded/battered and processed meat products. In general, it appears that unprocessed meats, with the exception of pork, share the same perception of healthiness and nutritional value while breaded/battered and processed meat products are perceived with "lost benefits", unreliable quality or even as "artificial". The key attributes of unprocessed products were "leaner", "easy to cook" and "convenient". These attributes appear to be important characteristics that separate eggs and "white meats" (unprocessed chicken, canned tuna and salmon) from the rest of the products. In a similar way, "difficult to digest", "for special occasions" and "I don't know how to cook them" were common descriptors for discriminating unprocessed turkey, pork and red meat products from the rest of the products.

Whole turkey was expected to share the same characteristics as eggs, chicken and fish, however it did not have the same positive impact as it was considered "for special occasions" or for "guest or parties" and by some participants as "too big" and "difficult to cook" during the construct elicitation. Ground chicken and ground beef were situated close to the centre of the consensus configuration, indicating disagreement in participants' perceptions of these products. While some participants perceived ground chicken as a "cheap", "healthier" and "leaner" "substitute of beef" during the construct elicitation, others perceived it as "tasteless" and found "no application for it". This might suggest that "healthier substitutes" are not always well accepted or preferred over the original product.

Our results concur with Verbeke's (2000) findings, where unprocessed poultry products in Belgium were perceived as healthier, leaner and safe in comparison to pork and beef products. Russell and Cox (2003; 2004) observed that Australians associated unprocessed red meats with healthy products, such as fish and white meats. These authors also found that white meats and fish were perceived by middle-aged and young Australians as "healthy", "lean" and "with high nutritional value", in contrast to lamb chops, pork chops and beef sausage which were perceived as "unhealthy" and "fatty". In their study, attributes such as nutrition, quality, utility and health were important characteristics used to discriminate among meat products.

It is interesting to note that price, although a very common construct during elicitation, does not dominate the consensus configuration. This may be as a consequence of the fact that price is "a subjective measure of relative value" (Grunert, 1997) or that price does not restrict meat purchases as suggested by our participants during construct elicitation. Thomson & McEwan (1988) found that economic factors were not important in the consensus configuration of 25 meat products. Myrland *et al.,* (2000) observed product attributes of seafood to be more important perceived barriers for consumption than beliefs concerning price. Kennedy and others (2004) found that price in UK was not important for chicken meat choice.

The frequency of occurrence of constructs during the elicitation step likely reflects their importance for consumers but in this study they did not dominate the consensus configuration. Common constructs in addition to those factors previously discussed, were the need for "easy to find or available everywhere" products and an interest in "tasty" products that give "good leftovers" for "convenience" and time-saving in food preparation. We found that consumers did not prefer "frozen" products as most of them prefer a "fresh taste". Middle-aged and older participants perceived red meats as "healthy" and as a "good source of iron" (n=4) but "makes cholesterol high" (n=2). Communication campaigns

regarding beef and pork nutritional value and health aspects may change consumers' negative perceptions of these meats.

Ethnicity and demographic characteristics can also play an important role in consumption patterns and consumer demands for food (Resurrección, 2003). We observed consumers to have positive and better perceptions of a product that was "traditional or reminds them of home" regardless of its manufacturing process. For example, salmon reminded one participant of her Norwegian heritage as her family served it frequently. Lamb was a traditional meat for some Asian Canadians (n=3) while for 2 Canadians, beef was a fond reminder of their childhood days. Food processors must take the multicultural diversity of Canada into account; different backgrounds and system of values can lead to different product perceptions and preferences (Daghfous *et al.,* 1999). Therefore, segmentation strategies might result in improved acceptability and increased consumption of value-added chicken products.

The results of this study present an understanding of the factors perceived to be important in the selection of meat products. This knowledge provides basic information and a guide which could be used by Canadian poultry processors in order to optimize existing products or identify opportunities for new products by translating consumer concerns into product characteristics. For instance, it is clear that Canadian consumers are not looking for alternatives to traditional poultry processed products such as chicken wings. Today, consumers are seeking convenient and nutritious products with healthy processing characteristics such as the ones associated with fresh chicken breasts or salmon. Moreover, the lack of importance of price suggests that consumers might be willing to pay higher prices for those value-added products that best satisfy their needs.

Identifying consumers' perceptions of food products is one of the first steps to reach consumer-oriented new product development (Sijtsema *et al.,* 2002; van Kleef *et al.,* 2005). However, since product choices and preferences are shaped on the basis of product perceptions (Costa & Jongen, 2006), it is apparent that further research is needed to identify the most important attributes that affect

consumers' preferences for value-added chicken products and consumers' willingness to pay for these products in order to assure competitive and successful new value-added poultry product development for Canadian poultry processors.

2.4 Conclusions

In Canada, chicken consumption has increased dramatically over the last 30 years. Therefore, to support the continuing growth, the Canadian poultry industry must create more value-added chicken products to satisfy consumers' demands. Today, it is clear that a new product will be successful after it gains consumer acceptance; thus, optimal new products must include "the voice of the consumer".

In this study, RGM in conjunction with GPA were used to investigate consumer perceptions of poultry and other meat products including eggs. Results from this study suggest that attributes related to healthiness, nutrition, composition, processing and convenience characteristics are driving today's consumer preferences for meat products. Price did not appear to be an important attribute for differentiating among meat products.

This knowledge provides insight into consumer needs and product choices and could be used as a basis to develop or promote poultry products to better attend to consumers' demands and concerns. In this regard, it is evident that traditional poultry processed products such as chicken nuggets or flavoured wings represent the type of products consumers perceive in a negative way, while products with attributes associated with fresh chicken breasts or salmon are positively perceived. Thus, new product development of poultry products should focus on satisfying consumers' needs for nutritious and convenient products with healthier processing characteristics than those of traditional processed poultry products.

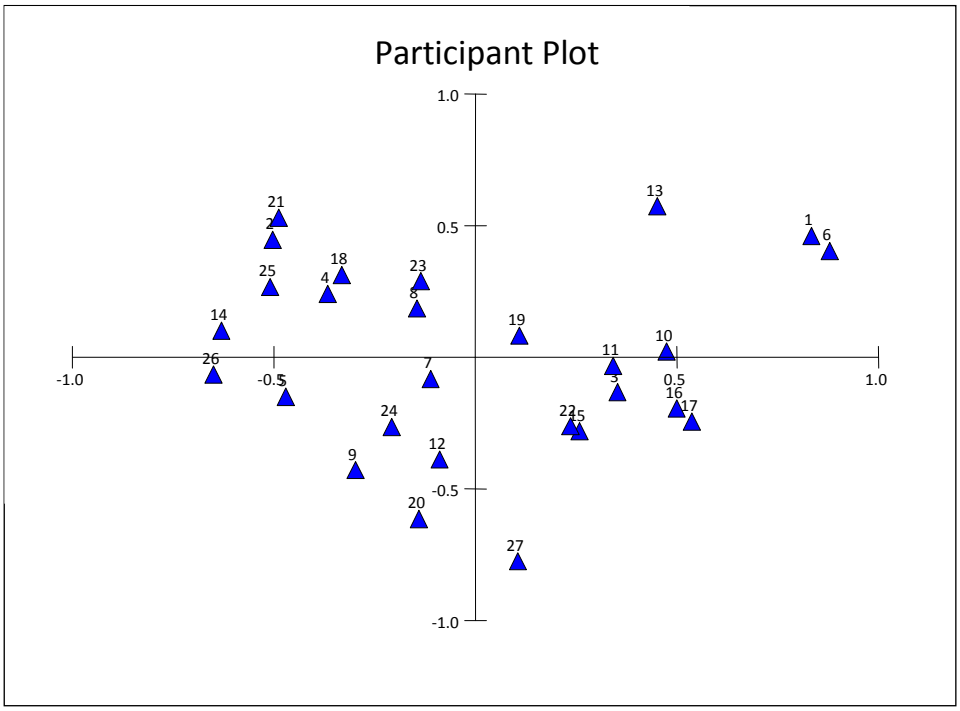

Figure 2.1 Participant plot from GPA

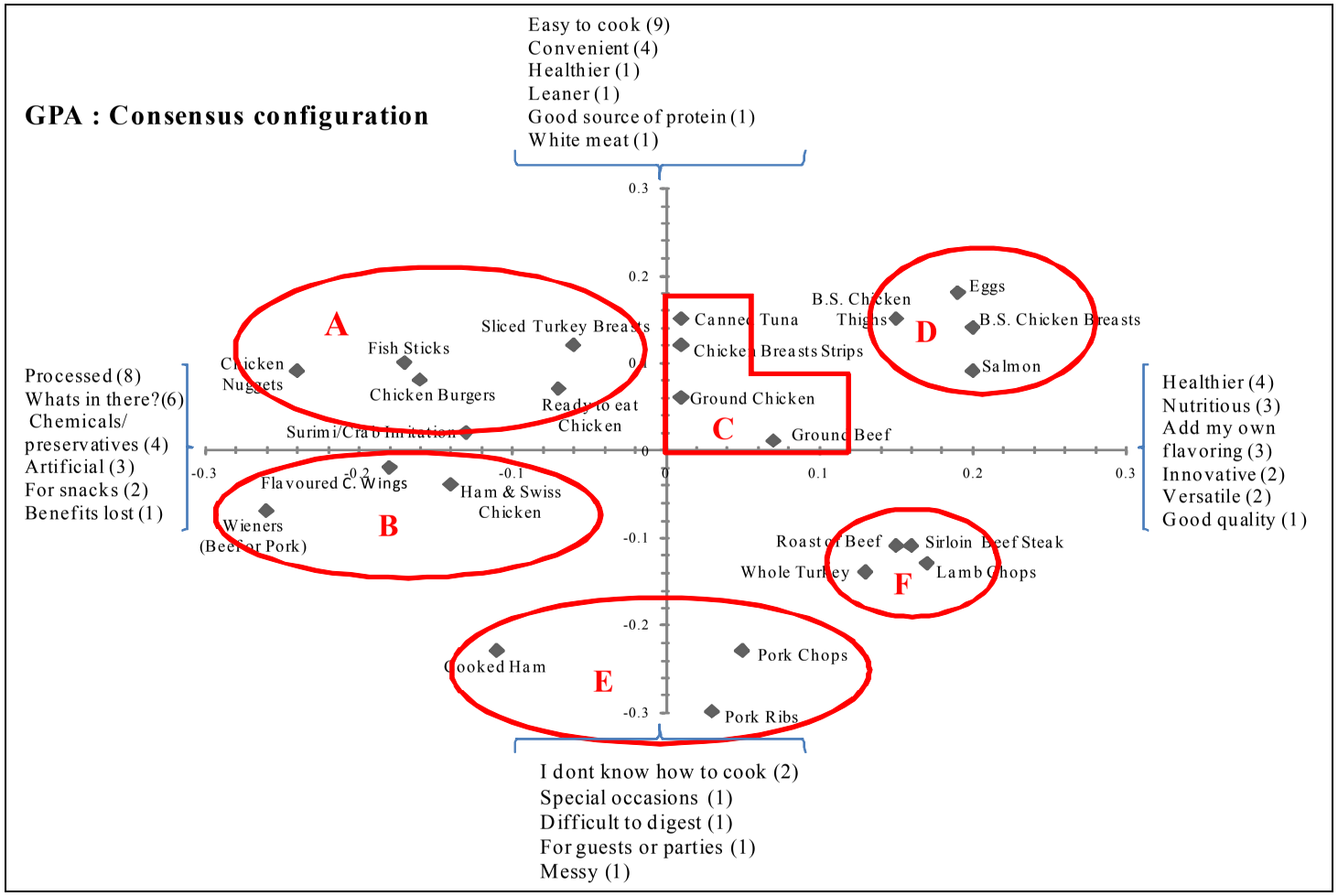

Figure 2.2 Grouping of meat products according to GPA consensus configuration

Table 2.1 Meat products used to elicit contextual attributes

1. Eggs
2. Boneless, skinless chicken breasts
3. Boneless, skinless chicken thighs
4. Chicken breast strips
5. Chicken burgers
6. Chicken nuggets
7. Flavoured chicken wings
8. Ground chicken
9. Ham and Swiss chicken breast (Cordon Bleu)
10. Ready to eat chicken
11. Whole turkey
12. Sliced turkey breasts
13. Ground beef
14. Roast beef
15. Sirloin beef steak
16. Wieners (beef or pork)
17. Cooked ham
18. Pork chops
19. Pork ribs
20. Canned tuna
21. Fish fingers or breaded fish
22. Salmon
23. Surimi or crab imitation
24. Lamb chops

Table 2.2 Constructs with correlations greater than 0.7 with the two dimensions of the consensus configuration generated by GPA

Dimension 1 (23.82%)		Dimension 2 (19.25%)	
Positive axis	**Negative axis**	**Positive Axis**	**Negative Axis**
Add my own flavoring (3)	Animal welfare concerns (1)	Children like it (1)	Difficult to digest (1)
Allows creativity (1)	Artificial (3)	Compulsory (1)	For guests or parties (1)
Create my own (2)	Benefits are lost (1)	Contaminants/bacteria concerns (1)	I don't know how to cook (2)
Flavours are added better (1)	Cooking process concerns (1)	Convenient (4)	Messy (2)
Good appearance (1)	For fast courts (1)	Easy to cook (9)	Special occasions (2)
Good combination (1)	For snacks (1)	Feel like preparing (1)	
Good quality (2)	Good for freezing or storing (1)	Fun to cook (1)	
Healthier (5)	Have chemicals/preservatives (4)	Good source of protein (1)	
High nutritional value (3)	I don't know what's in there (6)	Healthier (1)	
Innovative with seasoning (2)	I don't trust the quality (4)	Leaner (2)	
Pure meat (1)	Junk food (1)	Main meal (1)	
Versatile (4)	Mealy (1)	White meat (1)	
	Never buy it (1)		
	No control over taste (2)		
	Processed (8)		
	Sodium source (1)		

* Numbers in parentheses indicate the number of participants rating the constructs

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Chapter 3

Identification and WTP for product attributes affecting consumer preference for value-added chicken products[2]

1. Introduction

Globally, the increased popularity of poultry products is driven by population growth and demographic developments, price, consumer preference and concerns for nutrition and convenience (Roenigk, 1999; AAFC, 2005). Poultry products are perceived as a healthier alternative to red meats and an inexpensive alternative to other meat products (McCarthy *et al.,* 2004; AAFC, 2006; CFC, 2009; FAO, 2008; Magdelaine *et al.*, 2008). Global poultry production of ready to cook products is forecasted to increase to 42,380 thousand tonnes by 2017 from an estimated 36,287 thousand tonnes in 2006 (OECD-FAO, 2008).

Chicken consumption is growing primarily around two major product lines: convenient or ready-to-eat value-added chicken products for home meal replacements (Goddard *et al.,* 2007) and poultry products for foodservice (Roenigk, 1999; Magdelaine *et al.,* 2008). These expanding markets have increased Canadian poultry producers' interest in developing consumer oriented value-added chicken products (Goddard *et al.,* 2007) that are innovative, easy to prepare, affordable meal solutions to satisfy consumer needs for new experiences and their willingness to spend for prepared food. In managing these challenges, product development that incorporates the "voice of the consumer" is crucial to understand and satisfy consumers' needs (van Kleef *et al.,* 2005; de Carlos *et al.,* 2006; van Kleef, 2006).

In previous repertory grid research (chapter 2) healthiness, nutrition, composition, processing and convenience were identified as consumer attributes for discriminating poultry products among other meat products. Identification of the most important product attributes is required to generate consumer driven product specifications for the development of value-added chicken products with consumer appeal.

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This research is an initial attempt to provide the Canadian poultry industry with insight into consumer oriented value-added chicken product development by identifying product attributes that affect consumer preference for value-added chicken products and by assessing consumer willingness to pay (WTP) for those attributes. This information will allow chicken processors to develop new products in response to consumer attribute preferences while maintaining a price that could enhance not only their profits but consumer satisfaction.

Among the different consumer research methods, Conjoint Analysis or "trade-off analysis" provides the researcher with a statistical tool to determine how much value consumers put on each of the attributes that compose a product (Harrison *et al.,* 1998). This procedure is based on the idea that consumers evaluate the value of a product (overall utility) based on various factors or attributes (part-worth utilities) that are "considered conjointly" (Walley *et al*., 1999). Therefore, it provides a way for product developers to understand how consumer wants and needs are interrelated and consequently provides a means to translate these needs into physical product specifications (de Carlos *et al.,* 2006: Haddad *et al.,* 2007).

Conjoint analysis has been used in numerous applications involving multi-attribute consumer choices. In the food literature, for instance, conjoint analysis has been applied to food product development (Moskowitzs *et al*., 2004), product pricing and market segmentation analyses (Mennecke *et al*., 2007), consumer preferences (Cheng *et al.,* 1990; Ness & Gerhardy, 1994) and consumer purchase decisions (Carneiro *et al.,* 2005; Bernard *et al.,* 2007; Haddad *et al.,* 2007).

A well-known method to examine the true value or utility that consumers place on a product choice is the estimation of consumers' willingness to pay (WTP) for specific food attributes (Cranfield & Mangusson, 2003; Rodríguez *et al.,* 2008).

The contingent valuation approach (CV) is a survey-based method frequently used to elicit consumers' WTP in dollar amounts for situations in which there is a lack of market data (Mitchell & Carson, 1989; Lee *et al.,* 2008). This method is "contingent" because personal elicited WTP values are obtained contingent (conditional) upon a particular hypothetical market described (Mitchell & Carson, 1989).

A contingent valuation survey presents a detailed description of the product to be valued and the hypothetical circumstances under which it is offered. Respondents' WTP for the product being valued and socio-economic and demographic characteristics to estimate response validity and reliability are also elicited.

In CV surveys, one of the most widely used WTP elicitation techniques is the dichotomous choice (DC) question format (Ahmed, 2006; Rodríguez *et al.,* 2008). The single bound DC format, selected in this study, infers consumers' WTP by asking respondents if they would be willing to pay $X (bid) to obtain a product or not. Respondents must answer "yes" or "no" to a given bid (Howard & Allen, 2008).

In the food literature, the DC format has been applied to elicit consumers' WTP for fresh produce (Govindasamy & Italia, 1997), domestic fair trade (Howard & Allen, 2007), irradiated poultry products (Huang *et al.,* 2007), locally produced meat products (Maynard *et al.,* 2003), organic food (Gil *et al.,* 2000; Gracia & de Magistris, 2008; Rodríguez *et al.,* 2008; Ureña *et al.,* 2008) and organic wine (Brugarolas *et al.,* 2005).

The aims of this research were to identify product attributes affecting consumer preferences for value added chicken products through a conjoint analysis and determine the premium price that consumers are willing to pay for value-added chicken attributes using a dichotomous model.

3.2 Materials and Methods

3.2.1 Conjoint Design

3.2.1.1 Chicken Product Attributes and Levels

The identification of product attributes and their levels (Table 3.1) was based on the GPA consensus configuration of previous research (chapter 2) and a Mintel report (2008) summarizing regional performance and insights into key trends driving the global poultry product market.

3.2.1.2 Experimental Design

A full profile conjoint approach was chosen to present chicken consumers with realistic descriptions of alternative hypothetical chicken products (Green & Srinivasan, 1978). As a full profile approach (324 possible hypothetical chicken concepts) was not

feasible and too time consuming for consumer evaluation, an orthogonal fractional factorial design was used to generate a manageable number of concepts. This method allows the measurement of all attribute level main effects using only a subset of product concepts (representative concepts) taken from all possible combinations (Hair *et al.,* 2006).

Using PASW SPSS Conjoint 17.0 software (SPSS Chicago, Il) we obtained a total of 18 hypothetical chicken product concepts which involved the total number of final stimuli that were presented to each respondent for evaluation. Each different product concept contained one level from each of the 6 studied attributes. An additional 3 "holdout" chicken concepts were generated to validate the conjoint model by determining how consistently the model could predict consumers' preferences for a product concept not presented at the time of the study (SPSS, 2005; Sorensen & Bogue, 2005; 2006).

3.2.2 Data Collection

Ethical approval from the Faculty of Agricultural, Life, and Environmental Sciences Research Ethics Board was granted for this project in May 2009.

The study was conducted using a paper-based questionnaire which was divided into three sections. In the first section, participants provided socio-demographic as well as chicken consumption and purchase information.

In the second section, participants were presented with the 18 different hypothetical chicken products, in random order, and the 3 holdout concepts. Respondents were asked to rate the concepts based on their needs and preferences using a 9-point Likert scale from "1" (very low preference) to "9" (very high preference) for each chicken product. A rating scale was chosen in order to gather respondents' grade on a numbered scale for the perceived benefit or intensity of preference of each hypothetical product (Gustaffson *et al.,* 2007). It was also chosen to avoid validity and reliability problems associated with the large number of hypothetical products to be evaluated (Sorenson & Bogue, 2005). Participants were then asked to rank their preference for conventional, organic and free range chicken production to identify the most preferred hypothetical chicken product of each respondent. Insight into consumers' needs and preferences for a new chicken product was determined using an open question worded as

follows: “If you could develop an ideal new chicken product according to your own needs and preferences, which characteristics or attributes would you include in that product?”

In the third section, a dichotomous questionnaire using a close-ended format was presented to each participant to elicit their WTP for their most preferred hypothetical chicken product. This approach was chosen because of its simplicity and because it mimics the kind of choices consumers face during a normal purchase situation (Herriges & Shogren, 1996; Howard & Allen, 2008). The questionnaire involved a “yes”/”no” response to a defined bid which varied across respondents. There were 10 different bid levels for each chicken breast, chicken thigh and chicken leg product, ranging from $0.50 to $5.00, increasing in amount by $0.50. A follow-up question with five confidence indicators was posed to assess respondents’ degree of uncertainty in case the answer was “yes”. This approach was used as it was hypothesized that all respondents would experience uncertainty around their bid level as they would have no experience with the hypothetical products evaluated (Alberini *et al.,* 2003). According to Alberini and others (2003), there is no reason to believe that uncertain responses affect consumers’ WTP estimates.

The respective version of this dichotomous survey was presented on the basis of a participant’s response to the ranking question and the product rated with a higher score in the conjoint section. In total, 51% of the respondents received a version for chicken breast products while 26% and 23% received a version for chicken legs and chicken thighs, respectively.

3.2.3 Sample

Three hundred and one volunteer participants in the age group of 18-70+ years were randomly recruited from different locations in Edmonton; a local grocery store chain, a local coffee foodservice franchise and the University of Alberta campus in Edmonton, Alberta, Canada. Each participant was compensated with a $5 gift card for their commitment to complete the survey. The inclusion criterion for the study was consumption of chicken or chicken products at least once a month. Participants were not chosen to represent a particular socio-economic group. The sample size used in the

present study is comparable with previous research using Conjoint Analysis (Harrison *et al.,* 1998; Walley *et al.,* 1999; Sorenson & Bogue, 2005; 2006; Iop *et al.,* 2006; Boughanmi *et al.,* 2007; Lee & Cranage, 2007).

3.2.4 Conjoint Model Specification

A linear additive model was chosen to explain respondents' ratings. This model is the most common in conjoint analysis because it assumes that consumers "add up" the contribution that each attribute makes (part-worth utilities) to calculate the overall preference (total worth) or utility value for a particular chicken product (Louviere *et al.,* 2005).

Therefore, assuming that an individual's total worth is the result of each part-worth contribution, the overall preference for any chicken profile can be expressed as follows:

$$R = \alpha + \beta Comp + \gamma Prod + \delta Proc + \varepsilon Stg + \zeta Fl + \eta Ck + e \qquad (1)$$

where *R* is the respondent rating for a particular chicken product concept (combination of attributes' levels), *Comp* corresponds to the chicken composition (chicken part), *Prod* is method of production, *Proc* is method of processing, *Stg* is method of storage, *Fl* is the presence or absence of an added flavour, *Ck* is the method of cooking and e is a normal distributed error term. β, γ, δ, ε, ζ and η are part-worth utilities which can be estimated for each respondent by Ordinary Least-Squares (OLS) regression using dummy variables.

In this study, the regression model used to estimate the part-worth utilities of each of the respondents using their ratings was:

$$C_i = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + e_i \qquad (2)$$

where the dependent variable (C_i) was the rating (preference) from the $_i$th consumer and the independent variables (X_1-X_{10}) were the attribute levels.

3.2.5 Data Analysis

A total of 276 usable questionnaires were analyzed using PASW Statistics 17.0 software (SPSS Inc., Chicago, IL). Frequency analysis was performed to develop the demographic profile of the respondents, descriptive statistics were used to identify participants' overall preference for each hypothetical product and the PASW Conjoint option was used to identify the relative importance (RI) of each selected attribute. This software uses a general linear model analysis (OLS) to calculate the utility values or part-worth for each level of each attribute. These values, which are similar to regression coefficients, provide a quantitative measure of the preference for each attribute level. Therefore utility values can be used to determine the RI of each attribute (expressed as percentage) (SPSS, 2005). Pearson's R and Kendall's tau association values were used to evaluate the validity (suitability) of the conjoint model. Both correlation coefficients express the degree of linear relationship between two variables. Kendall's tau correlation was used to determine how consistently the conjoint model could predict consumers' preferences for the 3 holdout concepts (SPSS, 2005).

Data obtained from the willingness to pay section were analyzed by logit analysis using Stata 9.1 (StataCorp., College Station, TX) and frequency analysis using PASW Statistics 17.0 software (SPSS Inc., Chicago, IL). Logit analysis was selected as this technique can predict a dichotomous dependent variable (WTP) on the basis of continuous or categorical independent variables (respondents' demographics) (Hair *et al.,* 2006). In this case, the dependent variable (WTP) takes the value of '1' if the individual is willing to pay a premium price offered and '0' if not.

In the logit model, the probability (P) that the individual will accept a bid (X) can be expressed as (Hanemman, 1984):

$$P = 1/1+e^{-(\beta_0+\beta_1 C+\beta_2 A+\beta_3 G+\beta_4 HS+\beta_5 Ch+\beta_6 In+\beta_7 Edu+\beta_8 SM+\beta_9 MS+\beta_{10} FM+\beta_{11} WS+\beta_{12} OS+\beta_{13} FMeat+\beta_{14} FC+\beta_{15} CR+\beta_{16} FFC+\beta_{17} FRE+\beta_{18} FP+\beta_{19} PM+\varepsilon)} \quad (3)$$

where *C* corresponds to the cost, *A* is the individual's age, *G* is gender, *HS* is household size, *Ch* is children, *In* is income, *Edu* is education, *SM* is supermarket, *MS* is meat shop,

FM is farmers' market, *WS* is wholesalers, *OS* is other stores, *FMeat* is favourite meat, *FC* is Frequency of chicken consumption, *CR* most recently consumption (cooked or ready to eat), *FFC* is frequency of fresh chicken consumption, *FRE* is frequency of ready to eat chicken consumption, *FP* is favourite chicken part and *PM* is preference for chicken production method and ε is the random error term. $\beta_{0,}$ $\beta_{1...}\beta_{19}$ are the equation coefficients to be estimated by Maximum Likelihood Method (MLM). At the same time, according to Hanemman (1984) and under the hypothesis that individual utility function is linear, the WTP mean can be estimated using the following expression:

$$E\ (WTP) = -\beta_0/\beta_1 \qquad (4)$$

where β_0 represents the constant and β_1 the explaining variable (cost) in the estimated logit model.

3.3 Results and Discussion

3.3.1 Demographic Results

One hundred and sixty-three females (59%) and 113 males (41%) participated in the study (Table 3.2); this was expected as women are more likely to be the principal household food purchasers and are normally more willing to participate in survey research. Participants' ages ranged from 18 to 70+ years, with 36% between 18 and 30 years and 4% over 70 years. The remainder were evenly distributed across the other four age categories. About 31% reported having 2 members in their household (Edmonton's household average) and the majority of the respondents (67%) had no children. The educational status ranged from "some high school" to "post graduate university degree" however, 33% of the respondents had a university undergraduate degree and 20% had a post graduate university degree. Participants were almost evenly distributed across the household income ranges with a median of $60 to $80K, close to Edmonton's household median earnings. The survey population demographic characteristics were similar to those of Edmontonians recorded in the 2006 census (Statistics Canada, 2009)

Almost half of the respondents (45%) “most often” purchased their meat products at chain supermarkets, while 37% and 4% of the participants purchased meat products “always” at chain supermarkets or wholesalers, respectively. More than half (57%) “never” purchased meat products at a Meat Shop or Farmers’ Markets.

Chicken (30%) was the favourite meat among participants; then fish/seafood and beef/veal, which were equally preferred. Chicken breasts followed by thighs and drumsticks were the favourite chicken parts. In general, 52% of the respondents consumed chicken “2 - 3 times a week” and 37% used fresh chicken “2 - 3 times a week” to prepare any meal or snack at home, while 28% used fresh chicken “once a week” for the same purpose. The majority (83%) most recently ate chicken cooked at home rather than cooked in-store. The frequency of “ready to eat” chicken purchases were low; 37% of the participants purchased it only “once a month” and 28% “never” purchased it.

3.3.2 Conjoint Analysis

The conjoint model performed well. Pearson’s R 0.933 ($p=0.000$) and Kendall’s tau 0.869 ($p=0.000$) statistics indicated a strong agreement between the observed preferences (average product ratings) and the estimated utilities. Kendall’s tau 1.000 ($p<0.10$) for the 3 holdout products indicates a perfect consistency in participants’ ratings.

Within the attributes, the relative effect of each attribute level on the respondents’ preferences is determined by analyzing the utility values (Table 3.3). A higher value indicates a greater preference (SPSS, 2005). For example, a product made with “chicken breasts” ($U = 0.519$) gives a positive effect whereas a product made with “chicken legs” ($U = -0.352$) gives a negative effect on consumers’ preference for a chicken product. This result was expected as 51% of respondents rated chicken breast products with a higher score.

Since the constant and the utilities are expressed in a common unit, they can be added together to derive the total worth to consumers for different attribute combinations.

Overall, results revealed that chicken consumers had a strong preference for a refrigerated product (0.145) made with free range (0.233) chicken breasts (0.519), with no additives/preservatives (0.085) and no added flavour (0.163) which could be oven

heated (0.375). This attribute combination was the optimal chicken product among all possible product profiles.

"Organic" had the lowest utility value among the production methods, a result inconsistent with respondents' responses to the open ended question where 22% of participants expressed a need for organic meat products. The negative effect for organic production could be due to the higher cost of organic products in comparison to conventional ones (Castellini *et al.,* 2008) and perhaps the limited retail availability of organic meat.

The low preference for "microwavable" (-0.645) is not consistent with the increased demand for convenience products and trends for time-saving preparation using a microwave (Bertrand, 2005; Grunert, 2006; Jabs & Devine, 2006) or with Henson and others (2008) who found that Canadians perceive microwave ovens among other food and non food technologies as "safe", "beneficial" and "needed". Thus, this result may reflect dissatisfaction with some aspect of microwavable food.

3.3.2.1 Relative Importance of Attributes

The RI for an attribute is the percentage of utility range in relation to the total variation (sum of score ranges of each attribute). The relative importance for the *i*th attribute (RI_i) is calculated as follows:

$$RI_i = (\text{Utility Range}_i \; / \sum_{i=1}^{7} (\text{Utility range}_i) \quad \text{x } 100 \qquad (5)$$

In the present study, respondents were most influenced by production method (22.9%), followed by meat type (22.9%) and cooking method (21.4%). Processing method, flavour and storage method were less important but still significant attributes contributing 12.6%, 10.4% and 9.6%, respectively, to the preference rating.

Two alternative analyses were conducted to determine the RI of each attribute for households with and without children. It was hypothesized that households without children would include younger people looking for convenient meal solutions or older people looking for healthier processed products, while households with children would be more interested in production and processing methods rather than convenience. Results

revealed that households with children were most influenced by production method (24.1%), followed by meat type (22.8%) and cooking method (20.8%). Processing method, flavour and storage method were less important attributes contributing 13.3%, 9.8% and 9.1%, respectively, to the preference rating. These results were not different from those obtained for the whole sample. Interestingly, results showed that households without children were most influenced by meat type, (22.9%) followed by production method (22.4%) and cooking method (21.7%). Processing method, flavour and storage method were less important attributes contributing 12.2%, 10.7% and 9.8%, respectively, to the preference rating.

3.3.3 Willingness to Pay

Almost half of respondents (46% for chicken breasts, 54% for chicken legs and 53% for chicken thighs) were willing to pay a higher price for the product concept they rated with a higher score (Table 3.4). Approximately 32% of respondents were fully confident (very certain) about their WTP for a value-added product made of chicken breasts, while 28% and 41% of respondents were fully confident about their WTP for a value-added chicken leg and value added chicken thigh product, respectively (Table 3.5). The majority of respondents were somewhat certain or very certain regarding their WTP for the value-added chicken products (Table 3.5).

3.3.3.1 Who Is Willing to Pay for a Value-Added Chicken Product?

Frequency analysis of the study variables revealed that about half of respondents of each gender and in each household size, education and income bracket category were willing to pay a premium price for their highest rated product. Participants less than 39 years old and those aged 50-59 years were more likely to be willing to pay an extra amount, while those aged 40-49 years and over 60 years were not. As expected, those with lower levels of education (some high school or high school graduates) were less likely to pay for these products. About half of respondents who “always”, “most often” or “sometimes” purchase meat products at supermarkets and about 70% of respondents who “most often” purchase meat products at Meat Shops or Farmers’ Markets were willing to pay a premium price. Less than 40% of respondents who eat and use fresh

chicken "3 or more times a week" were willing to pay more for the value-added product they rated with a higher score as were half of respondents who eat and use fresh chicken and purchase ready to eat chicken "once" or "twice a week". About 40% of respondents who prefer conventional chicken products were willing to pay an extra amount while 52% who prefer free range and 60% who prefer organic products were willing to pay more.

We hypothesized that participant socio-demographic factors and meat consumption and purchase habits would be important determinants of consumers' WTP for value-added chicken products, as some studies propose that consumer behaviour is affected by various demographic factors such as age and gender, education and urbanization (Huang *et al.,* 2007). A logit model including all factors was estimated to explain respondents' WTP. The results of the estimated model are presented as marginal effects (i.e. the change in predicted probability associated with changes in the explanatory variables) (Table 3.6).

In this model, bid, age, farmers' market shopper, most recent consumption of chicken as cooked at home or purchased ready-to-eat, and preference for chicken production method (conventional, free range or organic) were significant ($p<0.10$) factors explaining respondents' WTP for the product they rated with the highest score. Results showed that the probability of an individual's WTP for a value-added chicken product was primarily influenced by the kind of chicken eaten most recently followed by the proposed premium amount. When controlling for all other variables, a one unit increase in the last time the respondent ate ready to eat chicken increases by 17% the probability an individual will be willing to pay more for a value-added chicken product.

A one unit increase in the bid amount ($0.50) decreases the probability an individual will pay more by 12%.

A one unit increase in age category decreases the probability that an individual will pay more by 5.7%. This suggests that young people are more likely to try and to pay for new value-added processed products. This finding is consistent with Govindasamy & Italia's (1997) study which found that older American consumers showed a higher

demand for fresh unprocessed products than younger consumers, who were looking for convenient meals and processed products.

If an individual is less likely to purchase meat products at Farmers' Markets, it decreases the WTP probability by 8.7%. This result was expected as according to the National Farmers' Market Impact Study 2009 Report, people who shop at Farmers' Markets are less concerned about price while looking for fresh, locally produced food and healthy food choices.

A one unit change in the preference for chicken production (i.e. from conventional to free range or organic) increases the probability by 9.7% that an individual will be willing to pay more for a value-added chicken product. In a Government of Alberta study (2000), 68% of organic consumers were 'strongly' or 'somewhat certain' in their willingness to pay about 10% more for organic foods.

The results of this model indicate that consumers' WTP is not dependent on respondents' meat preferences or frequency of chicken consumption but on price as well as respondents' age, kind of chicken most recently eaten, shopping habits, and chicken production preferences, which are related to consumer attitudes and beliefs.

As only five independent variables were found to be significant in explaining consumer's WTP for value-added chicken products in the full model, three different models were proposed.

Model 1 was based on social demographics, model 2 on gender, income and store purchasing habits and model 3 on the basis of participants' meat preferences, chicken consumption and chicken purchasing habits. Results of these alternative models were not different from the full model.

3.3.3.2 How Much More Will Consumers Pay for a Value-Added Chicken Product?

Results of the logit analysis without explanatory variables indicate that as expected, as the bid increases, the probability of accepting the bid decreases (Table 3.7). By substituting each coefficient in equation (4), the empirical average WTP was $2.40 more over the base price of $9.80/kg (+24.5%) for a value-added chicken breast product, $3.22 more over the base price of $9.60/Kg (+33.5%) for a value added chicken leg

product and $2.93 more over the base price of $8.10/Kg (+36.2%) for a value-added chicken thigh product.

3.3.4 Insights into Consumers' Needs for a New Value-Added Chicken Product

In this study, about 71% of participants responded to an open question designed to obtain broad information on consumers' ideas for a new value-added chicken product. In general, combinations of the attributes evaluated in the questionnaire were provided as ideas for a new value-added chicken product. For example, participant 2 stated he would like a "free range, natural, oven or pan heated, not frozen" chicken product while participant 31 prefers a "no additives/preservatives, oven heat, refrigerated, added flavour" chicken product. Some respondents included different attributes, such as "affordable prices" and "organic and free range products availability" as well as "locally raised products", "grain fed animals", "no GMO fed animals" and "no use of antibiotics" or "no hormones fed animals". Other examples were "boneless, skinless chicken products", "easy to prepare products", "low in fat", "personal package sizes" and "ethical farming practices", which in previous research (chapter 2) were all found to be positively perceived attributes among meat products. In previous research and this study some respondents expressed their dislike for microwavable products and disdain for products processed into unusual shapes such as chicken nuggets and chicken popcorn. Participant comments generated by the open-ended question also contribute insight regarding product attributes important to consumers in addition to the primary study tool.

3.4 Conclusions

Knowing what consumers want and how they make product choices is important to the survival of processors in the highly competitive food market. In Canada, chicken consumption has increased over the last three decades (AAFC, 2006) and the value-added poultry product market is growing. Therefore, to sustain this momentum, Canadian chicken processors must adapt their products to suit consumer needs and demands.

This study was designed to generate insight into consumer attribute preferences and WTP for value-added chicken products. Results from the conjoint analysis revealed that consumers give a higher importance to production method followed by meat type,

cooking method, processing method, flavour and finally storage method. The RI of these factors did not vary between households with and without children. This suggests that consumer preferences are strong regardless of the presence of children at home.

Among the attributes assessed, the greatest negative utility were given to "chicken legs" and "microwavable heated", while "chicken breasts" and "free range" production method produced the most positive utility values. In this particular study, respondents gave the highest utility to an empirical refrigerated product composed of free range chicken breasts, with no additives/preservatives, no added flavour and oven heated.

On average, half of respondents were willing to pay a premium price of $2.40 or 25% more over the price of a conventional chicken breast for a value-added chicken breast product, $3.22 or 33.5% more over the price of a conventional chicken leg for a value added chicken leg product and $2.93 or 36.2% more over the prices of a conventional chicken thigh for a value-added chicken thigh product.

Consumers' WTP was found to be associated with the importance they attach the product's attributes and not to their level of education, household size, number of children, income, meat preferences or chicken eating habits. Perhaps a larger population or the inclusion of other regions in Canada may reveal a different outcome in explaining consumers' WTP. Special attention should be paid to young people as they represent market growth potential for value-added chicken products.

In summary, results from this study provide valuable information on consumer product attribute preferences and WTP for the development of new value-added chicken products that meet consumer demands. Undoubtedly, premium prices (bids) played a very important role in the applied methodology. However, these empirical results justify the development and promotion of new value-added chicken products. Additional research is desired to determine if the value-added chicken products presented here are financially feasible and sufficiently profitable and to determine if the existing gap between consumers' WTP intentions and the actual WTP behaviour for purchase of these products will result in competitive new value-added chicken products.

Table 3.1 Value-added chicken product attributes and their levels for the conjoint design

Attributes	Levels
Meat Type	Chicken breasts
	Chicken thighs
	Chicken legs
Production Method	Free range
	Organic
	Conventional
Processing Method	No additives/preservatives
	Low calories/salt
	All natural ingredients
Storage Method	Refrigerated
	Frozen
Flavour	New added flavour (e.g. new ethnic recipe)
	No added flavour
Cooking Method	Microwavable
	Oven heated
	Pan heated

Table 3.2 Survey respondent description (N=276)

	Percentage
Gender	
Male	41%
Female	59%
Age	
18 – 29 years	37%
30 – 39 years	16%
40 – 49 years	16%
50 – 59 years	17%
60 – 69 years	10%
70 +	4%
People living in the household	
1 person	16%
2 persons	35%
3 persons	20%
4 persons	20%
5 persons	9%
Members in the household under 18 years old	
0 person	67%
1 person	17%
2 persons	11%
3 persons	3%
4 persons	2%
Education	
Some high school	1%
High school graduate	9%
Some university or college	16%
College diploma/degree	13%
University undergraduate degree	33%
Some post graduate university study	8%
Post graduate university degree (e.g. Master's or Ph.D.)	20%
Household Income	
Less than $20,000	12%
$20,001 - $40,000	21%
$40,001 - $60,000	15%
$60,001 - $80,000	16%
$80,001 - $100,000	15%
More than $100,001	21%

Table 3.3 OLS estimated utility values for chicken product attribute and their levels

Attribute	Level	Utility Estimate	Std. Error	RI (100%)
Meat Type	Chicken breasts	0.519	0.134	22.922
	Chicken thighs	-0.167	0.134	
	Chicken legs	-0.352	0.134	
Production Method	Free range	0.233	0.134	22.97
	Organic	-0.119	0.134	
	Conventional	-0.114	0.134	
Processing Method	No additives/preservatives	0.085	0.134	12.609
	Low calories/salt	-0.075	0.134	
	All natural ingredients	-0.010	0.134	
Storage Method	Refrigerated	0.145	0.101	9.638
	Frozen	-0.145	0.101	
Flavour	New added flavour	-0.163	0.101	10.408
	No added flavour	0.163	0.101	
Cooking Method	Microwavable	-0.645	0.134	21.452
	Oven heated	0.375	0.134	
	Pan heated	0.269	0.134	
Constant		5.648	0.106	

Table 3.4 Response to WTP for each chicken part (premium price over the conventional product price)

	Chicken Breasts (n=140)					Chicken Legs (n=72)					Chicken Thighs (n=64)				
Price	**Yes**	**%**	**No**	**%**	**Total**	**Yes**	**%**	**No**	**%**	**Total**	**Yes**	**%**	**No**	**%**	**Total**
$0.50	13	76	4	24	17	6	75	2	25	8	7	100	0	0	7
$1.00	11	92	1	8	12	6	86	1	14	7	4	67	2	33	6
$1.50	9	64	5	36	14	3	50	3	50	6	4	57	3	43	7
$2.00	5	38	8	62	13	6	67	3	33	9	5	63	3	38	8
$2.50	3	21	11	79	14	2	29	5	71	7	2	33	4	67	6
$3.00	6	40	9	60	15	2	33	4	67	6	3	43	4	57	7
$3.50	5	36	9	64	14	6	75	2	25	8	3	50	3	50	6
$4.00	4	31	9	69	13	3	50	3	50	6	2	33	4	67	6
$4.50	4	29	10	71	14	2	25	6	75	8	0	0	6	100	6
$5.00	5	36	9	64	14	3	43	4	57	7	4	80	1	20	5
Total	65	46	75	54	140	39	54	33	46	72	34	53	30	47	64

Table 3.5 Distribution of confidence levels for "Yes" responses for WTP for participants' preferred chicken part

Product	Confidence Level										Total
	Very Certain 100%		Somewhat certain 75%		Certain 50%		Somewhat Uncertain 25%		Very Uncertain 0%		
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	
Chicken Breast	21	32.3%	34	52.3%	3	4.6%	5	7.7%	2	3.1%	65
Chicken Leg	11	28.2%	25	64.1%	2	5.1%	1	2.6%	0	0%	39
Chicken thigh	14	41.2%	17	50.0%	1	2.9%	2	5.9%	0	0%	34

Table 3.6 Estimated marginal effects for the full model

Variable	dy/dx	p>|z|
Bid	-0.1191376	0.000
Age	-0.0573448	0.018
Gender*	-0.0287536	0.689
Household size	-0.0077585	0.835
Children	0.0185339	0.711
Income	0.0228603	0.335
Education	0.0042343	0.854
Supermarkets	-0.0017765	0.970
Meat Shops	0.0230361	0.552
Farmer's Market	-0.0875566	0.021
Wholesalers	-0.0068633	0.830
Other store	-0.0027869	0.946
Favourite Meat	-0.0000003	0.219
Times eat chicken	0.0584106	0.203
Cooked or Ready	0.1698554	0.100
Times use fresh chicken	-0.0425280	0.168
Times use ready to eat	-0.0253576	0.460
Favourte chicken part	-0.0011060	0.381
Production method	0.0972669	0.027

*dy/dx is for discrete change of dummy variable from 0 to 1

Table 3.7 Logit analysis without predictor variables for WTP for a value-added chicken product

WTP	Coefficient	Std. Error	p>|z|
Chicken Breast			
Bid	-0.4991695	0.1301788	0.000
Intercept	1.1990170	0.3896325	0.002
Chicken Leg			
Bid	-0.3586132	0.1730151	0.038
Intercept	1.1567160	0.5408299	0.032
Chicken Thigh			
Bid	-0.4675543	0.195882	0.017
Intercept	1.3709680	0.5879169	0.02

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Chapter 4

Summaries, Conclusion and Future Recommendations

4.1 Summaries

Over the recent decades, changes in the Canadian diet have had a dramatic impact on the demand for poultry products. Per capita chicken consumption has gradually increased from 13kg in 1975 to 31.8kg in 2008 (AAFC, 2006; CFC, 2009) and is expected to continue increasing over the next 15 years (AAFC, 2005). Health and nutrition concerns, population growth, demographics, food trends, affordability, versatility and convenience have all contributed to this increased popularity of chicken (AAFC, 2005; CFC, 2008).

Today, chicken "white meat", particularly chicken breasts, are Canadians' most popular choice among meat products (CFC, 2008). However, Canadians purchase chicken in a variety of forms reflecting consumer willingness to pay for certain attributes such as boneless or skinless chicken cuts, which offer the consumer convenience in preparation (Goddard *et al.,* 2007). The growing demand for value-added chicken products creates new opportunities for the poultry industry to expand while generating new products concordant with consumers' needs. Yet consumer perceptions of chicken product attributes, the importance they attach to them and their WTP for different value-added chicken products have been seldom studied.

In order to provide valuable consumer insight that can help poultry processors effectively satisfy consumer demands, the present research used qualitative and quantitative analyses to understand how consumers make meat product choices, to quantify their preferences for product attributes and assess the prices they are willing to pay for value-added chicken products.

4.1.1 Chapter 2: Perceptual Attributes of Poultry and Other Meat Products

Repertory grid interviews were conducted with 27 consumers of chicken to identify those attributes that drive consumer preferences among 24 commonly consumed meat products. Data derived from each personal interview were analyzed and combined by Generalized Procrustes Analysis (GPA) which generated a two principal axes map

describing the important perceptual attributes common among the participants. This map separated the products into 6 groups by "processed/artificial vs. healthy/nutritious" and "healthy/convenient vs. difficult to digest/messy" attributes. Contrary to expectation, price did not appear to be important for differentiating the products. Results from this study revealed that Canadian consumers are not looking for alternatives to traditional poultry processed products such as chicken wings, which are perceived as "processed" or "artificial" with "lost benefits". Attributes related to *healthiness, nutrition, composition, processing, quality*, and *convenience* are driving current consumer preferences among meat products. Moreover, the lack of importance of price suggests that consumers might be willing to pay a higher price for those value-added products that best satisfy their needs. Results of this study present a description of the factors perceived to be important in the selection of meat products and provide a basic guide to optimize existing products or identify opportunities for new product development. However, it became apparent that further research was needed to identify the most important attributes that affect consumers' preferences for value-added chicken products and assess consumers' willingness to pay for these products in order provide Canadian chicken processors with insight into the development of competitive and successful new value-added chicken products.

4.1.2 Chapter 3: Identification and WTP for Product Attributes Affecting Consumer Preference for Value-Added Chicken Products

In this study, a conjoint analysis was designed to generate hypothetical value-added chicken profiles composed of six attributes from the RGM study. The attributes varied according to predetermined attribute levels. In addition, a dichotomous choice model was used to estimate consumers' WTP for the attributes. Results from the conjoint analysis revealed that at the time of purchase, consumers give a higher importance to production method followed by meat type, cooking method, processing method, flavour and finally to the storage method. Among the attributes assessed, the greatest negative utility was given to "organic", "chicken legs", "microwavable heated", "low calories/salt", "new added flavour" and "frozen" while the most positive utility values

resulted for “free range”, “chicken breasts”, “oven heated” “no additives/preservatives”, “no added flavour” and “refrigerated”.

Logit analysis findings indicated that premium prices played a key role on consumers’ WTP. However, on average and with a very high certainty, half of respondents were willing to pay a premium price of $2.40 or 25% more over the price of a conventional chicken breast for a value-added chicken breast product. At the same time, half of the respondents were willing to pay $3.22 or 33.5% more over the price of a conventional chicken leg for a value-added chicken leg product and $2.93 or 36.2% more over the price of a conventional chicken thigh for a value-added chicken thigh product. Consumers’ WTP was primarily associated with the premium price, respondent’s age and the preference for production method. Respondent’s level of education, household size and number of children, income, meat preferences, chicken consumption and purchase habits had no significant effect on WTP. These findings suggest that consumers’ WTP is correlated with the importance they attach to the product’s characteristics or attributes such as the ones studied here (i.e. type of production method, type of meat, type of cooking method, etc.) which add value to the products and benefits to the consumer.

4.2 Methodological Considerations

The adoption of the research methodologies applied in the present study is recommended for future qualitative and quantitative consumer research. However, a few considerations merit thought for improvement.

In regards to the Repertory Grid technique, the first consideration is the number of elements (meat products) selected for construct (attributes) elicitation and the timing of the follow-up rating session. According to Jankowicz (2004) there is no limit in the number of elements to be evaluated. However, presenting the participant with 24 different meat choices resulted in a very long interview which sometimes led to respondent fatigue or impatience to finish the interview. This problem may limit the number of possible new attributes or bias respondents’ ratings. It is not known how many participants in this study experienced fatigue. A future study could avoid this problem by presenting participants with fewer elements or by collecting the ratings a day later.

A second consideration concerns the validation of data. Validity is defined as the degree to which a test procedure measures what it was intended to measure (Lawless & Heymann, 1998). However, some qualitative researchers argue this definition commonly accepted for quantitative research and debate different terms for validity in qualitative studies such as true value, credibility or consistency (Appleton, 1995). According to Appleton (1995) a qualitative study is considered to be credible if "it reveals accurate descriptions of individuals' experiences". In the present study, the number of elicited constructs per participant varied from 16 to 42. In order to analyze the data, all constructs were classified into one of 141 groups of similar constructs. Researcher interpretation and classification of constructs into different groups is normal practice during a Repertory Grid study, but participants do not have the opportunity to validate these new constructs and determine if their personal constructs have the same meaning and coincide with those already in the group. However, during the elicitation process a key determinant of data validity depends on researcher ability to establish a connection and understand participant's construct meanings. In-depth understanding of participants' data provides the opportunity for an in-depth consumer perceptions study.

In Conjoint analysis, as in the Repertory grid, the first consideration is the number of hypothetical chicken products for evaluation. In this study, a fractional factorial design was used to reduce to a minimum the number of hypothetical product profiles. However, for some participants 18 product profiles composed of 6 different attributes may have been too many to evaluate. This may also lead to fatigue and biased participant ratings. A future study could avoid this problem by selecting fewer attributes or attribute levels and therefore presenting participants with fewer product descriptions.

A final consideration to both research techniques concerns the geographic area from which participants were drawn. The relative importance of the attributes presented in this study may not be the same to inhabitants of other cities. Future research could apply these same methodologies in other Canadian cities to validate our findings in the Canadian population.

The most obvious consideration of the WTP study was the relatively small sample size (n=276) for the analysis of the independent variables hypothesized to explain

consumers' WTP and therefore included in the logit model. Even with 276 participants significant factors explaining consumers' WTP for value-added chicken attributes were noted; however, insufficient sample size could lead other variables to fail significance. According to Mitchell and Carson (1989), a sample size of 250 to 2,500 participants is generally required to achieve reliability in any Contingent Valuation study but this has to be balanced with the study's budget and time. The products evaluated in this research were hypothetical, however, future research intended to estimate and explain consumers' WTP for commercially feasible products should therefore include a higher number of participants.

4.3 Conclusions and Future Recommendations

Considering the increased consumer demand for value-added chicken products, the opportunity this presents for poultry processors, and the lack of information in the literature related to Canadian consumer meat preferences and choices for product attributes, it was important to generate a perceptual model of attributes that describe meat products from the consumer perspective, to identify the most important product attributes driving consumer preferences for value-added chicken products and to assess consumers' WTP for these attributes.

RGM in conjunction with GPA was a valuable tool to understand meat product perceptions from the consumers' perspective and to generate meaningful information about consumers' general needs for nutritious, convenient and healthy processed meat products.

Empirical evidence identified though a Conjoint Analysis identified production method, meat composition and convenience in food preparation as the most important attributes used by consumers when purchasing chicken products. Less important attributes were processing, flavour and storage method. An approach using the same technique would be desired in order to assess the importance of other product attributes such as packaging, package size, product shape, addition of functional or healthier ingredients (vitamins and minerals) as well as local chicken production and animal welfare, which were not studied in this research but were found to be consumer concerns.

Empirical results show that a large proportion of respondents (50%) are willing to pay on average 30% more for new value-added chicken products such as the hypothetical products evaluated here. However, further work is recommended in order to investigate the existing gap between consumers' WTP intentions and the actual WTP behaviour for purchasing these products. An interesting finding arising from this study was that consumers' WTP was only associated with the premium price, the age and the preference for production method. According to Gil and others (2000), Hartman and New Hope (1997) suggested that WTP for organic products might be influenced by consumer lifestyles rather than by the usual socioeconomic factors. Considering "organic" as a value-added attribute, perhaps a segmentation approach with a larger population or the inclusion of other regions in Canada may reveal a different outcome in explaining consumers' WTP for value added-chicken products. This warrants a subsequent study in order to provide poultry processors with distinct consumer segments, allowing them to target different groups of consumers.

In this study, the implementation of a 'certainty of response option' to respondent's WTP provided a general idea of respondents' WTP certainty. According to Li & Mattson (1995), each individual has a true valuation of the products under evaluation, but the magnitude of this valuation is unknown. In this regard, it is possible for an individual to provide a "yes" answer even if the true valuation is less than the premium price, or a "no" answer even if it is higher than the given amount. Therefore, future investigations should assess the impact of such valuation on respondents' WTP estimates.

Overall, this research attempted to demonstrate how listening to "the voice of the consumer" could provide guidance and direction to the development of competitive new value-added chicken products and increase the chances of new product success. In this regard, results from this study provide initial insights on consumer perceptions and product choices that can be used by the Canadian poultry industry to meet consumer needs and concerns.

This research has highlighted that new product development of poultry products should not continue the line of traditional processed poultry products such as flavoured

chicken wings or chicken nuggets, but focus on satisfying consumers' needs for nutritious and convenient products with healthier processing characteristics such as the attributes associated with fresh chicken breasts. Empirical evidence showed that during a purchase situation, consumers are most influenced by attributes related to poultry production method, meat composition and convenience in food preparation and less influenced by processing, flavour and storage method. In this particular sense and according to the attributes evaluated in this research, consumers could be more attracted to a refrigerated free range chicken breast product which is intended to be oven heated, and has no additives/preservatives and no added flavour.

With 50% of respondents willing to pay for value-added product attributes, this research provides promising potential for the development of new value-added poultry products as a growth strategy for the Canadian poultry industry. However, continuous consumer-oriented research is highly recommended to continue satisfying consumer demands in a rapidly changing market.

4.4 References

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Appendix 1. Repertory Grid Study Demographic Questionnaire

Information about Yourself Participant: _____

1. Please indicate your gender:

❒ Male ❒ Female

2. Please indicate the age group that you belong to:

❒ 18-29 years ❒ 50-59 years
❒ 30-39 years ❒ 60-69 years
❒ 40-49 years ❒ 70 years plus

3. Please indicate how many people live in your household:

❒ 1 person
❒ 2 persons ❒ 4 persons
❒ 3 persons ❒ more than 5 persons

4. Please indicate how many people in your household are under 18 years of age:

❒ 0 person ❒ 3 persons
❒ 1 person ❒ 4 persons
❒ 2 persons ❒ more than 5 persons

5. Where do you normally purchase your **meat products**? (Please circle the number that best represents your purchasing habits)

	Always	Most Often	Sometimes	Rarely	Never
Supermarkets (i.e., Save-On, Safeway)	1	2	3	4	5
Meat Shops (i.e., M&M Meat Shops)	1	2	3	4	5
Farmers' Markets	1	2	3	4	5
Wholesalers (i.e., Costco)	1	2	3	4	5
Other: (please specify)	1	2	3	4	5

6. Which of the following foods would you consider to be your favourite?

❒ Beef/Veal ❒ None of the above
❒ Bison ❒ Lamb/Sheep/Mutton
❒ Chicken ❒ Fish/Seafood
❒ Turkey ❒ Meatless meal
❒ Pork

7. On average, how often do you eat chicken?

- ❒ More than 3 times a week
- ❒ 2 – 3 times a week
- ❒ Once a week
- ❒ Every 2 – 3 weeks
- ❒ Once a month
- ❒ Never

8. Thinking of the last time you ate any kind of chicken at home, was the chicken cooked in your home or brought in a "ready to eat"?

- ❒ Cooked at home
- ❒ Ready to eat

9. On average, how often do you personally cook or prepare any meals or snacks at home with fresh chicken?

- ❒ More than 3 times a week
- ❒ 2 – 3 times a week
- ❒ Once a week
- ❒ Every 2 – 3 weeks
- ❒ Once a month
- ❒ Never

10. On average, how often do you purchase "ready to eat" chicken?

- ❒ More than 3 times a week
- ❒ 2 – 3 times a week
- ❒ Once a week
- ❒ Every 2 – 3 weeks
- ❒ Once a month
- ❒ Never

11. Which would you say is the favourite chicken part to eat in your household?

- ❒ Breasts
- ❒ Wings
- ❒ Legs
- ❒ Thighs/ Drumsticks
- ❒ Skin
- ❒ Whole chicken
- ❒ Other_____

12. Please indicate the level of education that corresponds to what you have completed:

- ❒ Some high school
- ❒ High school graduate
- ❒ Some university or college
- ❒ College diploma/ degree

- ❒ University undergraduate degree
- ❒ Some post graduate university study
- ❒ Post graduate university degree (e.g. Master's or Ph.D.)

13. Please indicate the range that represents your household income level in the year 2007, before taxes:

- ❒ Less than $20,000
- ❒ $20,001 - $40,000
- ❒ $40,001 - $60,000
- ❒ $60,001 - $80,000
- ❒ $80,001 - $100,000
- ❒ More than $100,001

Appendix 2. Conjoint and WTP Survey

Identifying product attributes affecting consumer preference for value-added chicken products

Part A: Conjoint Questionnaire **Participant: _____**

1. As a consumer, you look for products that suit your needs and preferences. Please review the following concepts describing different chicken products. Some of the concepts might be less or more attractive to you. Please show how much you like each concept using the following scale:

1	2	3	4	5	6	7	8	9
Dislike Extremely	Deslike Very Much	Deslike Moderately	Dislike Slightly	Neither Like nor Dislike	Like Slightly	Like Moderately	Like Very Much	Like Extremely

Chicken Product Description			Preference
Regular/ Conventional	Chicken thighs	All natural ingredients, New added flavour, Refrigerated product, Pan heated	Rate:
		No additives/preservatives, New added flavour, Refrigerated product, Oven heated	Rate:
	Chicken legs	Low calories/salt, New added flavour, Refrigerated product, Pan heated	Rate:
		No additives/preservatives, No added flavour, Refrigerated product, Microwave heated	Rate:
	Chicken breasts	All natural ingredients, No added flavour, Frozen product, Oven heated	Rate:
		Low calories/salt, New added flavour, Frozen product, Microwave heated	Rate:

Chicken Product Description			Preference
Organic	Chicken legs	Low calories/salt, No added flavour, Refrigerated product, Oven heated	Rate:
		All natural ingredients, New added flavour, Refrigerated product, Microwave heated	Rate:
	Chicken breasts	All natural ingredients, New added flavour, Refrigerated product, Pan heated	Rate:
		No additives/preservatives, New added flavour, Refrigerated product, Oven heated	Rate:
	Chicken thighs	No additives/preservatives, No added flavours, Frozen product, Pan heated	Rate:
		Low calories/salt, New added flavour, Frozen product, Microwave heated	Rate:

Chicken Product Description			Preference
Free Range	Chicken breasts	Low calories/salt, No added flavour, Refrigerated product, Pan heated	Rate:
		No additives/preservatives, New added flavour, Refrigerated product, Oven heated.	Rate:
	Chicken thighs	Low calories/salt, New added flavour, Refrigerated product, Oven heated	Rate:
		All natural ingredients, No added flavour, Refrigerated product, Microwave heated	Rate:
	Chicken legs	All natural ingredients, New added flavour, Frozen product, Oven heated	Rate:
		No additives/preservatives, New added flavour, Frozen product, Pan heated	Rate:

2. Please rate the next chicken concepts according to your preference using the following scale:

1	2	3	4	5	6	7	8	9
Dislike Extremely	Deslike Very Much	Deslike Moderately	Dislike Slightly	Neither Like nor Dislike	Like Slightly	Like Moderately	Like Very Much	Like Extremely

Chicken Product Description			Preference
Free Range	Chicken legs	No additives/preservatives, No added flavour, Frozen product, Microwave heated	Rate:
Free Range	Chicken thighs	All natural ingredients, New added flavour, Refrigerated product, Microwave heated	Rate:
Regular/Conv.	Chicken breasts	All natural ingredients, New added flavour, Frozen product, Oven heated	Rate:

3. Please rank the following chicken production methods according to your preference using the following scale:

1	2	3
Least Preferred		Most Preferred

Conventional Chicken: _____

Organic Chicken: _____

Free Range Chicken: _____

4. If you could develop an ideal new chicken product according to your own needs and preferences, which characteristics or attributes would you include in that product?

Part B: Willingness to Pay Questionnaire **Participant: ——**
(Example for conventional chicken breast product)

1. Assume that the cost of a **regular/conventional chicken breast** is $9.60/kg at the store where you usually shop. If a new chicken product with all the attribute combinations you rated with the higher score for **regular/conventional chicken breast** were available for purchase, would you purchase it if the cost were ($0.50)/kg more than the regular product, in other words if the total price were ($7.75)/kg?

Yes □ No □

If you answered "YES" to the question above, how certain are you of your answer?

Very Certain	Somewhat Certain	Unsure	Somewhat Uncertain	Very Uncertain
□	□	□	□	□

If you answered "NO" to the question 1, would you buy this new chicken product if the price were the same as the average price of the regular chicken breast?

Yes □ No □

Appendix 3. Conjoint and WTP Survey Demographic Questionnaire

Information about Yourself Participant: _____

1. Please indicate your gender:

❒ Male ❒ Female

2. Please indicate the age group that you belong to:

❒ 18-29 years ❒ 50-59 years
❒ 30-39 years ❒ 60-69 years
❒ 40-49 years ❒ 70 years plus

3. Please indicate how many people live in your household:

❒ 1 person
❒ 2 persons ❒ 4 persons
❒ 3 persons ❒ more than 5 persons

4. Please indicate how many people in your household are under 18 years of age:

❒ 0 person ❒ 3 persons
❒ 1 person ❒ 4 persons
❒ 2 persons ❒ more than 5 persons

5. Where do you normally purchase your **meat products**? (Please circle the number that best represents your purchasing habits)

	Always	Most Often	Sometimes	Rarely	Never
Supermarkets (i.e., Save-On, Safeway)	1	2	3	4	5
Meat Shops (i.e., M&M Meat Shops)	1	2	3	4	5
Farmers' Markets	1	2	3	4	5
Wholesalers (i.e., Costco)	1	2	3	4	5
Other: (please specify)	1	2	3	4	5

6. Which of the following foods would you consider to be your favourite?

❒ Beef/Veal ❒ Lamb/Sheep/Mutton
❒ Bison ❒ Fish/Seafood
❒ Chicken ❒ Meatless meal
❒ Turkey ❒ None of the above
❒ Pork

7. On average, how often do you eat chicken?

- ❒ More than 3 times a week
- ❒ 2 – 3 times a week
- ❒ Once a week
- ❒ Every 2 – 3 weeks
- ❒ Once a month
- ❒ Never

8. Thinking of the last time you ate any kind of chicken at home, was the chicken cooked in your home or brought in a "ready to eat"?

- ❒ Cooked at home
- ❒ Ready to eat

9. On average, how often do you personally cook or prepare any meals or snacks at home with fresh chicken?

- ❒ More than 3 times a week
- ❒ 2 – 3 times a week
- ❒ Once a week
- ❒ Every 2 – 3 weeks
- ❒ Once a month
- ❒ Never

10. On average, how often do you purchase "ready to eat" chicken?

- ❒ More than 3 times a week
- ❒ 2 – 3 times a week
- ❒ Once a week
- ❒ Every 2 – 3 weeks
- ❒ Once a month
- ❒ Never

11. Which would you say is the favourite chicken part to eat in your household?

- ❒ Breasts
- ❒ Wings
- ❒ Legs
- ❒ Thighs/ Drumsticks
- ❒ Skin
- ❒ Whole chicken
- ❒ Other_____

12. Please indicate the level of education that corresponds to what you have completed:

- ❒ Some high school
- ❒ High school graduate
- ❒ Some university or college
- ❒ College diploma/ degree
- ❒ University undergraduate degree
- ❒ Some post graduate university study
- ❒ Post graduate university degree (e.g. Master's or Ph.D.)

13. Please indicate the range that represents your household income level in the year 2008, before taxes:

- ❒ Less than $20,000
- ❒ $20,001 - $40,000
- ❒ $40,001 - $60,000
- ❒ $60,001 - $80,000
- ❒ $80,001 - $100,000
- ❒ More than $100,001