

**SOUTH AFRICAN CONSUMERS'  
PERCEPTION OF SOY AND SOY  
PRODUCTS**

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**Mini-dissertation submitted in the School for  
Consumer Sciences at the North-West  
University in partial fulfillment of the  
requirements for the degree  
Magister Consumer Sciences (Foods).**

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Potchefstroom  
2005**



*DEDICATION*

*To Eugene for your love, support and understanding.*

*To my family for your support and encouragement.*

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## ACKNOWLEDGEMENTS

I would like to thank the following people who contributed to this study:

- ❖ I would like to thank God for giving me the opportunity, knowledge, strength and perseverance to complete this study.
- ❖ I would like to thank my husband who stood by my side, for the love, support and encouragement throughout this study.
- ❖ Dr. Carien Scholtz for her continuous support, guidance and motivation throughout the study.
- ❖ Prof. Lena Bosman for her guidance and motivation.
- ❖ Dr. Suria Ellis for her time and guidance with the statistical analyses.
- ❖ Prof. Johann Jerling for his initiative and contribution to this study.
- ❖ Jane Badham for her initiative and contribution to this study.
- ❖ Helah van der Walt and Sonja van der Westhuizen at the Ferdinand Postma library for helping with the literature searches.
- ❖ My parents for giving me the opportunities they gave me, for their love, support and encouragement to complete this study.
- ❖ I would also like to thank my family-in-law for their support encouragement and love during this study.
- ❖ Anel van Wyk de Vries, for her support during our studies.
- ❖ My friends for their support throughout this study.
- ❖ Karen Human who did the language editing.

## **AFRIKAANSE TITEL**

*Suid-Afrikaanse verbruikers se persepsie van soja en soja produkte.*

## **OPSOMMING**

Daar word deesdae toenemend op die gesondheidsvoordele van voedsel gefokus. Funksionele voedsel kan gesien word as voedsel wat gesondheidsvoordele bo en behalwe die basiese nutrisionele waarde inhou, as gevolg van aktiewe voedselkomponente soos isoflavone in soja. Verbruikers behoort aangemoedig te word om sojabone te gebruik om die gesondheid van die bevolking te verbeter. Funksionele voedsel soos sojaprodukte word dus tot 'n groter mate ernstig as 'n nuwe produkontwikkelingsgeleentheid vir die voedsel industrie oorweeg.

Daar is beperkte inligting oor die Suid-Afrikaanse verbruikerspersepsie van soja en soja produkte beskikbaar. Daarom is die doel van die studie om Suid-Afrikaanse verbruikers se persepsie van soja en sojaprodukte te bepaal. Respondente (n=3001), 16 jaar en ouer is ewekansig uit nege metropolitaanse (n=1997) en plattelandse (n=1004) gebiede in Suid-Afrika gekies, verteenwoordigend van die vier hoof rasse-groepe (Blankes, Swartes, Kleurlinge en Indiërs). Manlike en vroulike respondente is in die studie ingesluit (50/50). Data-insameling is deur middel van vraelyste, bestaande uit 17 voedselverwante afdelings elk met onderafdelings gedoen. Vier van die 17 voedselverwante afdelings het inligting oor soja, sojaprodukte en die gesondheidsvoordele daarvan bevat en is in hierdie studie gebruik. 'n Sub-datastel (n=2437) is vanaf die oorspronklike datastel (n=3001) saamgestel, wat slegs dié respondente (81%) ingesluit het wat al voorheen van soja gehoor het. Hierdie sub-datastel is vir verdere statistiese analise gebruik. Die populasiegroep is vermenigvuldig met 'n spesifieke geweege factor, wat vooraf statisties deur Markinor bepaal is, om elke rasse-groep se bydrae tot die geweege Suid-Afrikaanse populasie te bepaal.

Geen prakties betekenisvolle verskille in persepsies van metropolitaanse en plattelandse verbruikers is gevind nie. Die resultate van die studie dui daarop dat Swartes en Indiërs in Suid-Afrika meer van die smaak van soja as Blankes en Kleurlinge hou, terwyl Blankes ook 'n negatiewe persepsie van die smaak van soja het. Swartes en Indiërs in Suid-Afrika gebruik meer soja as Blankes en Kleurlinge. Swartes sal, in teenstelling met Blankes, meer soja gebruik indien dit meer gereedlik beskikbaar is en daar 'n groter produkverskeidenheid is. Blankes gebruik minder soja as enige van die ander rassegroepe. Volgens die resultate sal selfs die beskikbaarheid van 'n groter verskeidenheid soja produkte in die mark steeds nie die gebruik van soja deur Blankes en Indiërs beïnvloed word nie. Indiërs en Blankes was meer bewus van vleisvervangers wat van soja vervaardig word.

Groot prakties betekenisvolle verbande is gevind tussen verbruikers se persepsie teenoor sekere stellings en die verskillende rassegroepe onderskeidelik. Daar is gevind dat die grootste betekenisvolle verskille tussen Blankes en Swartes was. Daar bestaan beslis 'n behoefte aan verdere navorsing op Suid-Afrikaanse verbruikers se persepsies van soja en die resultate behoort aan Suid-Afrikaanse verbruikers en die industrie beskikbaar gestel te word. Bemarkers van soja en sojaprodukte moet op die groepe wat die meeste van soja se smaak hou en wat dit meer gereed gebruik, fokus.

**Sleutelwoorde:** Soja, sojaprodukte, verbruikerspersepsie, gesondheidsvoordele, funksionele voedsel

## **SUMMARY**

Food that provides health benefits beyond basic nutrition, by virtue of physiologically active food components are known as functional foods. Soybeans contain some of these phytochemical components such as isoflavones. Due to the lack of relevant data, the aim of this study was to assess South African consumers' perceptions towards soy and soy products. Respondents (n=3001) were randomly selected from 9 metropolitan as well as rural areas in South Africa. The questionnaire consisted of 17 food related topics. Four of these sections (which were also used in this study) probed information on soy and soy products. The data of 81% respondents (n=2437), who were aware of soy, were used for further statistical analyses. There were no practical significant differences between rural and metropolitan respondents' perceptions regarding each statement. Large practical significant differences were found between racial groups regarding most of the statements. In general Blacks were more positive towards the use and taste of soy, as opposed to Whites. More Indians were aware of meat substitutes made from soy than the other racial groups. Marketing efforts in South Africa should focus on those groups that like the taste of soy best and who would consume soy regularly.

**Key words:** Soy, soy products, consumer perception, health benefits, functional food

# **CHAPTER 1**

## ***INTRODUCTION***

## **CHAPTER 1**

### **INTRODUCTION**

#### **1. BACKGROUND AND MOTIVATION**

The lack of knowledge on South African consumer awareness and perception of soy and soy products motivated this study. The aim of this chapter is to motivate the uniqueness of this research relevant to the existing knowledge, especially in South Africa.

The health benefits of foods has never before been so strongly focussed on. The philosophy that food can be 'health promoting' beyond its traditional value is gaining acceptance among scientists (Anon, 1995:496). Nutrients and other nonnutrient constituents of foods may play a role in potentially preventing the premature onset of chronic disease, or in preventing a disease or disorder from ever occurring at all, has captured the attention and imaginations of nutrition scientists, medical practitioners, the food and pharmaceutical industries, and the general public (Wrick, 1994:480).

Food that provide health benefits beyond basic nutrition, by virtue of physically active food components are known as functional foods (Gardner, 1994:468; Hasler, 1998:63). Functional foods are very seriously being considered as a major new product opportunity for the food industry (Ichikawa, 1994:453). Interest in functional foods among consumers in the United States of America (USA), has followed the upswing in interest in physical fitness and overall physical well-being. There is a increasing demand for products that are claimed to be of natural origin, closely following existing trends in Europe and elsewhere (Gardner, 1994:468). Scientific findings on functional foods have captured the attention of so many and emerged at a time that also shows unprecedented public interest in matters of health and well-being, and a public fascination with diet in North America, Europe and Japan. Treating chronic diseases such as heart disease,

hypertension, and cancer can be very expensive and attention has been drawn to these high costs. Chronic diseases might reasonably be reduced in severity, delayed in onset, or even prevented in many people by changing one's behaviour earlier in life (Wrick, 1994:482).

One of the largest trends that has been gathering momentum in the USA is an increasing awareness of the role of diet and proper nutrition to maintain health and prevent disease (Child & Poryzees, 1997:433). Consumers believe that foods contribute directly to their health. This increasing consumer awareness in combination with advances in various scientific domains, provides companies with unique opportunities to develop an almost infinite array of new functional food concepts (Van Kleef *et al.*, 2002:93). Numerous studies linking diet and health have been publicized over the past years and consumers are demanding more information on how to achieve health benefits through food and vitamins (Childs & Poryzees, 1997:433). Health enthusiasts and vegetarians have known for years that foods rich in soy protein offer a good alternative to meat, poultry, and other animal based products. As consumers have pursued healthier lifestyles in recent years, consumption of soy foods has risen steadily, bolstered by scientific studies showing health benefits from these products. Foods, including soy, are complex collections of chemicals that can be beneficial for many people in many situations, but can be harmful to some people when used inappropriately. In that fact lies the scientific dilemma: when do data show a food is safe and when do they show there could be problems (Henkel, 2000:15). The Food and Drug Administration (FDA) authorized a health claim, to be used on food labels, stating that 25 grams of soy protein each day may significantly reduce the risk of coronary heart disease, if consumed as part of a balanced diet (Henkel, 2000:15; Taylor *et al.*, 2002:1).

Soybeans and soy products have been used as a staple and highly nutritious food source for centuries in Eastern Asia (Young *et al.*, 1984:16). Soybean contains some potentially anticancerous compounds, such as protease inhibitor and phytic acid (San Lin, 1994:406). Soy beans are unique among the legumes because they are a concentrated source of

isoflavones (Messina, 1999:439S). Isoflavones in soy beans may exert a myriad of biological effects and it has been hypothesised that they may reduce the risk of a number of chronic diseases (Messina, 1999:440S). Given the nutrient profile and phytochemical contribution of the beans (DuBois & Hoover, 1981:343), nutritionists should make a concentrated effort to encourage the public to consume beans in general and more soy foods in particular (Messina, 1999:440S). The rapid growth in the world population, the gradual improvement in the growth rates of national economies, and an acknowledged deficiency of protein in human diets of a majority of world population have created a unique opportunity to enhance human consumption of soy bean protein in different parts of the world. Insufficient protein consumption is a concern in developing nations, like Africa, where the cost or availability of traditional forms of animal protein results in protein deficiencies. Soy is a low-cost, highly available protein source, yet it is largely overlooked because of its unfamiliar texture and taste (Wansink & Cheong, 2002:276). The acceptance of an unfamiliar food depends on making it appear consistent with cultural perceptions and consumption patterns (Wansink & Cheong, 2002:277).

There is little data on South African soy consumption. Recent figures from the Department of Agriculture show an increase in soybean production from 154 000 tons in 2000 to 226 000 tons in 2001. The increase in soy production in South Africa does imply that there is a growing market for soy products (Hinze *et al.*, 2004:40). The key consumer needs currently include fresh foods, healthier foods, foods with distinct and interesting flavour and textural characteristics, convenience, and appropriate pricing. Safety in food is very important, so the consumer needs must include several extra terms, safe foods that are fresher, fresh foods that are convenient and interesting, and a variety of combinations of new consumer requirements that include all of the previous requirements. The level to which these consumer needs become integrated into a product is the key to success (Katz, 1999:63). Since the ultimate target of the food industry is the satisfaction of the customer, it is essential to consider not only the objective consumer needs (nutrition and safety), but also subjective aspects of consumer satisfaction (sensory properties) and consumer attitudes (Karel, 2000:56). Perception of a

food product has been shown to be affected by many individual factors. These factors include taste, texture, odour, information from labelling and images, attitudes, memory from previous experience, price, prestige, nutritional content, health belief, familiarity and brand loyalty (Kronl & Lau, 1982:140).

Most consumers state that their food choices are largely determined by taste, as opposed to any consideration of nutrition or food safety. The consumer concept of food 'taste' also include smell and the oral perception of food texture. Sensory responses to smell, taste, texture, and sight of foods have major influence on food eating habits and preferences (Nestle *et al.*, 1998:S53). There has been a growing recognition that the use of preference alone, in the sense of pure affective judgement, is an insufficient measure as an explanatory variable for food choice (Schutz, 1994:25).

The United Soybean Board (USB) of the USA yearly proclaims national reports that gives insight into consumers' attitude towards and knowledge of nutrition, health and soyfoods. In South Africa, the lack of similar reports is an issue of great concern. In the light of the above discussion, the soy industry has a bright future in South Africa and if sufficient research can be done and published, this industry will make a huge impact on the South African economy and the nutritional status of all the people living in South Africa.

## **2. OBJECTIVE OF THE STUDY**

### **2.1 Main objective**

To assess South African consumers' perception of soy and soy products.

## **2.2 Specific objectives**

The specific objectives of the study were to determine:

- whether South African consumers are aware of soy and soy products;
- to compare rural and metropolitan South African consumers' perceptions on soy and soy products
- whether South African consumers like the taste of soy;
- whether they eat/drink soy and soy products;
- whether they intend to use more soy and soy products if it was readily available;
- whether they use soy or soy products;
- whether they would use more soy if there was a bigger product range;
- whether South African consumers are aware of meat substitutes made from soy.

## **3. STRUCTURE OF THE MINI-DISSERTATION**

As reflected in the above, this mini-dissertation discusses consumers' perception regarding soy and soy products in general, as well as, to a limited extent in the South African context. Following this introductory chapter, Chapter 2 gives an overview of the literature considered important for the interpretation of data from the manuscript in this dissertation. This includes a short introduction and literature regarding the consumer, the soybean, soy as a source of protein, consumer acceptance, consumer perception towards nutrition, functional food, soy and soy products, influence of health claims on consumer perceptions and behaviour and a conclusion. Chapter 3 consists of a manuscript on South African consumers' perception of soy and soy products. Addendum A presents the questionnaire used in this study. Addendum B presents the description and uses of different types of soy products. Addendum C presents the different soy mince product types available in South Africa. The references used in this mini-dissertation are provided according to the mandatory style stipulated by the North-West University, while the specific authors' instructions regarding style is followed in Chapter 3.

#### 4. AUTHOR'S CONTRIBUTIONS

This mini-dissertation was planned and executed by a team of researchers. The contribution of each researcher is given in the following table.

<i>Name</i>	<i>Role in the study</i>
Mrs. N Harmse (Food Scientist)	Author, statistical analyses, interpretation of data as well as literature searches and preparation of the mini-dissertation.
Dr. SC Scholtz (Food scientist, Nutritionist)	Study leader and co-author. Co-responsible for statistical analyses, interpretation of data and the writing of this mini-dissertation.
Prof. MJC Bosman (Food Scientist)	Co-study leader and co-author. Co-responsible for statistical analyses, interpretation of data and the writing of this mini-dissertation.
Prof. JC Jerling	Conceived idea of the study; Responsible for finding sponsorships, drawing up of questionnaires together with Markinor and the execution of the study.
Miss J Badham	Conceived idea of the study; Responsible for finding sponsorships, drawing up of questionnaires together with Markinor and the execution of the study.

The following is a statement from the co-authors confirming their individual role in the study and giving their permission that the article may form part of this mini-dissertation.

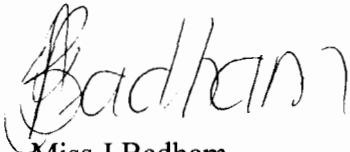
*I declare that I have approved the above-mentioned article, that my role in the study, as indicated, is representative of my actual contribution and that I hereby give my consent that it may be published as part of the Master's mini-dissertation of Mrs. N Harmse.*



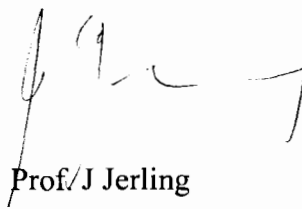
Dr. SC Scholtz



Prof. MJC Bosman



Miss J Badham



Prof. J Jerling

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**CHAPTER 2**

***LITERATURE REVIEW***

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **1. INTRODUCTION**

The aim of this chapter is to give the reader the necessary factual background for the interpretation of the manuscript presented in Chapter 3 by means of this literature review, as well as to provide the necessary insight into the study as a whole.

An introduction is given on the consumer, followed by an overview of the soybean, soy as source of protein, what is consumer acceptance, consumer perception towards nutrition, functional food, soy and soy products, influence of health claims on consumer perception and behaviour and a conclusion.

#### **2. THE CONSUMER**

Important developments in the position of food in the daily life of consumers and producers have taken place during the last century. A few years ago consumers were self-sufficient, but during the last century this changed into an industrialization of the food production process. At the end of the last century the amount of food was abundant in the industrialized countries, while at the beginning of the 20<sup>th</sup> century there was still a scarcity of food. When scarcity occurs, the main focus of consumers is on getting enough nutrition, whereas farmers and producers try to maximize the amount of production. Nowadays, changes in demographics, income distribution and labor force participation dictate changes in the food system. The producers have become aware of the fact that the food supply chain has to become a food demand chain that is driven by the consumers' priorities and needs. The above mentioned aspects influence the food product development process (Sijtsema *et al.*, 2002:565). The satisfaction of consumer wants and needs is the main emphasis of the marketing concept (Evans *et al.*, 1996:34).

These developments do not only have big influence on the food production chain, but they also have great impact on attitudes and beliefs in how consumers see their food (Sijtsema *et al.*, 2002:566). The consumer therefore is the most important factor in this whole process and will be discussed in further detail.

## **2.1 Defining consumer**

There is no need to justify consumer topics today since the subject is now an integral part of most marketing curriculums (Walters, 1978:1). According to Walters (1978:6), a consumer is the individual or individuals who exercise the right of acquisition and use over goods and services or products offered for sale by marketing institutions. Du Plessis *et al.*, (1994:141), defines consumers as people who have the money to buy and the willingness to buy. Solomon (1992:4), defines the consumer as a person who identifies a desire or a need, makes a purchase, and then disposes of the product during the three stages in the consumption process. Sometimes, different people may be involved in the process. The user and the purchaser of a product may not be the same person (Solomon, 1992:5). In the latter case, one may also refer to the consumer as the shopper or buyer.

## **2.2 The nature of consumer behaviour**

There is no universally acceptable definition of consumer behaviour. Consumer behaviour comprises the behaviour patterns of decision units (individuals as well as families) which precede, determine and follow on the decision process for the acquisition of need-satisfying products, ideas and services (Du Plessis & Rousseau, 1995:11).

People develop self-concepts and subsequent lifestyles based on a variety of external and internal influences (Du Plessis & Rousseau, 1995:79; Hawkins *et al.*, 1992:26). These lifestyles and self-concepts produce needs and desires, many of which require consumption decisions to satisfy (Du Plessis & Rousseau, 1995:79; Hawkins *et al.*,

1992:26). As a person or individual encounters a certain situation, the consumer decision process is activated. The consumer's internal and external characteristics will be influenced by this decision process. Self-concept is the way that we view ourselves, we try to live in a certain manner given our resources (lifestyle) (Hawkins *et al.*, 1992:26). Internal factors such as our personality, values, emotions, and memory determine our view of ourselves and the way we live. External factors such as culture, age, family, friends, and subcultures also influences the above mentioned. Our self-concepts and our lifestyles result in desires and needs that bring us to consider a purchase. The decisions that we make will cause learning and may affect many other internal and external factors that will change our current lifestyle and self-concept (Du Plessis & Rousseau, 1995:79; Hawkins *et al.*, 1992:26).

## **2.3 Factors influencing consumer's food choice**

According to Bareham (1995:10), the following factors have an influence on consumer choice. The factors are organized into four clusters, identified as; political, economic and technical; cultural and social; psychological and marketing influences. These factors will be discussed in further detail.

### **2.3.1 Political, economic and technical influences**

The availability of certain foods influences what consumers buy and eat. The primary aim of governments has been to make sure that customers buy safe products and that the customer has a certain amount of information on which to base purchase decisions. Legislation on public health protection and more specific initiatives by individual governments in the areas of food description, preservation, labelling and on nutritional information or advice to consumers have been shaped (Bareham, 1995:15).

The economy has a major influence on purchase behaviour. Income, the economy in which consumers live, and the prices of different foodstuffs are an obvious influence on purchase behaviour (Bareham, 1995:15; Du Plessis & Rousseau, 1995:81). Consumers tend to seek more and more convenience foods, which results in the increase of sales of processed and frozen foods. This option is available to the consumer because of technological innovation in terms of storage and food production. New developments such as functional foods, new sources of protein and the production of fat free products may lead to further product innovation (Bareham, 1995:16; Du Plessis & Rousseau, 1995:81).

#### **2.3.1.1 Food policies**

Food policies intend to inform consumers decisions about who gets what food, how, when, and with what effect. Governments over the world do not directly intervene in what people eat, yet all to some extent have policies on food. A nation's diet is intimately related to issues, and hence with policies that have to do with health and education. An inadequately fed nation can result in health- and economic problems of considerable concern to any government. Public concern has risen over how food is produced and preserved (Bareham, 1995:17). Governments reacted on these issues with policies which have shaped legislation on how food is described, labelled and preserved. The aim of the legislations has been to ensure a high standard of public health protection. Governments have also taken a more active role in giving advice to consumers on nutrition so they are more informed about what foods to consume (Bareham, 1995:18).

Consumers will be satisfied if the supermarket shelves are lined with products that with regular use, not only meet consumer demands for good taste, but also help prevent chronic disease processes. There are public health and scientific issues that must be addressed, and there are also regulatory barriers to overcome. The scientific and public health issues surrounding functional foods is their effectiveness at truly improving public health (Wrick, 1994:482).

### **2.3.1.2 Descriptions**

When consumers buy orange juice it is different from orange squash, orange drink, or real orange juice. Therefore, legislation is in place to define the ingredients contained in certain products so that the consumer can differentiate between products that might otherwise have the same name (Bareham, 1995:19). There is tremendous political pressure which can have an influence on whether, and in what form, a food product is made available to the consumer (Bareham, 1995:20).

### **2.3.1.3 Labelling**

The following discussion on labelling will be focussed on European and American labelling policies. Nutritional labelling listing calories, carbohydrates, fats, fibre, sugar and salt is voluntary except in the case of a health or nutrition claim which requires the most basic nutritional labelling with a listing of these ingredients and related energy values. Claims such as 'cures cancer' or 'prevent heart disease' are banned, but health claims such as 'low fat' or 'high fibre' are permitted as long as the foodstuff meet certain specifications. The term 'dietary' or 'dietetic' may not be used on normal health foods (Bareham, 1995:21; Nyaga, 2000:97).

### **2.3.1.4 Food hygiene**

The aim of food hygiene legislation is making sure the consumer does not get sick or is not killed by what they consume (Bareham, 1995:21). When food harvesting is finished, all foods, whether vegetable or animal in origin, start to decay. There are two main processes namely the catalytic and deterioration influences. The catalytic influence of enzymes lead to breakdown of food constituents. The deterioration is caused by micro-organisms which are present in all food. The old or traditional approach to

microbiological deterioration is to change the condition of the food, so that even if the microbes are present, they are not able to grow and multiply. This is the basis of traditional techniques such as drying, salting, smoking, curing and pickling and are still used in modern food processing, but there are now improved techniques for achieving the same result (Bareham, 1995:21; Frasier & Westhoff, 1988:4).

#### **2.3.1.5 Quality of diet**

A healthy diet is very important to consumers and governments are concerned about this issue. This has two difficult implications; the government should wait for evidence to mount up before declaring that certain foods are better for consumers and others worse, and the limitations indirectly imposed on the consumer's freedom of choice. Governments should be very sure of evidence before making public declarations that certain foodstuffs are bad for the health of the nation. Freedom of choice for consumers regarding healthy diets is also a very difficult concern for governments. Governments are expected to pass legislation that ensure that people do not get poisoned or killed by the food they eat, but consumers do not like to be told what they may or may not eat or consume (Bareham, 1995:22). Governments therefore should recommend nutritional intakes rather than to legislate (Bareham, 1995:24).

#### **2.3.1.6 Additives**

Foods consists of a mix of chemicals, the main chemicals in food are fat, proteins and carbohydrates. Other chemicals such as vitamins, minerals, colours, emulsifiers and antioxidants are found in food (Bareham, 1995:24; Whitney *et al.*, 1998:4). According to Bareham (1995:24), an additive is anything added by a food manufacturer even if it is the same as a food component which occurs naturally. Additives can also be defined as substances not normally consumed as foods but added to food either intentionally or by accident (Whitney *et al.* 1998:503).

Consumer attitudes towards foods have changed in the last two decades, increasing the requirements for new products. Consequently, less extreme treatments or additives are being required. Minimally processed foods have new characteristics and satisfy this new consumer demand (Martins *et al.*, 2004:89).

#### **2.3.1.7 Economic influences**

Consumers eat foods that are quick and easy to prepare, accessible, and within their financial means (Whitney *et al.*, 1998:3). Consumer purchase behaviour is impacted by economic variables. One of the few laws in consumer behaviour, first elaborated by Erns Engel in the 1850s, shows that the poorer people are, the higher the proportion of their income is spent on food (Bareham, 1995:39). As people's income increases they switch to the purchase of more luxurious food items, such as meat and cheese, and move away from the staple items such as bread and potatoes. The relationship between price and purchase is not a simple one, although, in general, as the price rises, the quantity of a foodstuff purchased decreases (Bareham, 1995:44) (Du Plessis & Rousseau, 1995:81).

#### **2.3.1.8 Technological influences**

Foods can be preserved by slowing down the rate of chemical deterioration and preventing microbial growth. The most successful technique for doing both is by freezing, although in some markets, canned goods are popular. Modern innovations in product development have been possible because of techniques such as freeze-drying, spray-drying, vacuum packaging and extrusion. Future innovations are likely in products such as functional foods and the use of novel forms of protein (Bareham, 1995:50).

The stocking and distribution of food is increasingly sophisticated and linked to instore computer systems which register sales. Special systems also enable analysis of consumer

purchases and can trigger the award of vouchers and other incentives to encourage repeat purchases. It may be speculated that in future home shopping might replace the need to visit a food store (Bareham, 1995:56; Du Plessis & Rousseau, 1995:81). The availability of home technology has affected the type of products bought. The growth in ownership of fridge-freezers and microwaves, in particular, has enabled the purchase of convenience products especially frozen or chilled ready-meals and snacks. However there are variations in the ownership of these devices and a growing backlash against frozen food and growing interest in chilled products with a taste and texture nearer to that of the fresh product (Bareham, 1995:57; Du Plessis & Rousseau, 1995:81).

### **2.3.2 Cultural and social influences**

Food is consumed by people, not only because of its instrumental and physiological benefit, but also so as to be able to socialize, to indulge in celebrations or to reflect their own persona (Bareham, 1995:63; Du Plessis & Rousseau, 1995:80; Whitney *et al.*, 1998:2). Culture has a huge influence on the food we buy, where we buy it and how we consume it. There are certain values and ways of behaving which shape the society in which we live.

This has an effect on the products a consumer buys (Bareham, 1995:63; Du Plessis & Rousseau, 1995:80). Because of religious beliefs, some foods are completely taboo in a particular society. Restrictions may be placed on when and what to consume or not to consume (Bareham, 1995:63; Du Plessis & Rousseau, 1995:80). To market researchers, socio-economic grouping is still the most widely used mechanism for market segmentation because there are identifiable links to purchase behaviour. Behaviour of groups are of particular significance to consumer researchers because their behaviour is often more predictable than that of individuals. Because of group pressure consumers buy products which they think will make people believe they belong to a particular group. The family unit may be seen as the strongest group where different members may have different roles and influences on consumer purchase. A family goes through a

number of stages, from just a couple living alone, to a group with children living together, and back to the couple living alone again (Bareham, 1995:64; Du Plessis & Rousseau, 1995:81). If culture determines the norms of a particular group or nation then it will have an effect on what, and why people buy certain products. Consumers intend to buy a certain product because they expect it to have a functional value. Food provide calories, vitamins, and minerals to the consumer (Bareham, 1995:68; Whitney *et al.*, 1998:4). Certain products also provide symbols of meaning such as fish which is often thought of as a brain food, or spinach, as a food for strength, because of the association with Popeye. The specific culture by which we live affects the availability of a certain product (Bareham, 1995:70; Du Plessis & Rousseau, 1995:80).

The products people buy and consume are strongly affected by the beliefs associated with them. Certain foods are avoided altogether because of taboos. Religious doctrine can lead to avoidance, therefore the growth of specialist retail outlets selling, only kosher food. There is a growing interest in vegetarianism, and restaurants specializes in vegetarian foods. Taboos, religious doctrines, cults, scares and the status of different foods can thus all have a considerable impact on food consumption (Bareham, 1995:90; Whitney *et al.*, 1998:65).

A group is defined by the social scientists as involving two or more people who share common goals or objectives. Groups create pressures on individuals to conform and to adopt norms which are accepted ways of thinking or behaving (Bareham, 1995:119; Popenoe *et al.*, 1998:47). Reference groups are both groups to which a person actually belongs, and to which they aspire to belong (Bareham, 1995:120; Popenoe *et al.*, 1998:117). The effect is that an individual will adopt whatever beliefs, values or behaviour they perceive the reference group has adopted. In terms of consumer behaviour, reference group influence often has a more significant impact on brand choice rather than product choice (Bareham, 1995:120; Popenoe *et al.*, 1998:118).

### **2.3.3 Psychological influences**

The previous discussions has been concerned with a variety of political, economic, technical, cultural and social influences which can have an impact on consumer behaviour. These influences can be seen as external and to some extent outside the control of the individual. A consumer can be divided according to class, age, stage in the family life cycle, household size and income level. This can be used to segment the market. However, this does not provide an insight into the feelings, opinions, values, and motives of consumers. These constructs can be seen as internal influences to the consumer or to the individual (Bareham, 1995:143; Du Plessis & Rousseau, 1995:80) .

Personality is only one of a range of variables which influence lifestyle and lifestyle is only one of a range of factors influencing purchase behaviour. There is also the problem that many of the theories on which the applications to market research are based are themselves hotly disputed as explanatory ideas (Bareham, 1995:146; Du Plessis & Rousseau, 1995:80). The measuring rods used to measure whatever it is that those theories suggest should be measured, are also suspect on grounds of reliability and validity. There are more recent research that identifies a clearer relationship between personality traits and buyer behaviour. The personality theories of Maslow also provide an important theoretical basis to motivational research and to psychographic profiling which results in consumers being segmented according to lifestyle (Bareham, 1995:152).

Consumers can be categorized on the basis of their lifestyle. A consumer's lifestyle relates to how they spent their time and money, what they think is important and how they react when asked for their opinions on different subjects. Lifestyle is measured by putting to respondents a series of statements covering activities, opinions and interests which are reacted to in either 5 – point or 7 – point Linkert scales (Bareham, 1995:156). Consumers are then clumped into lifestyle groups if they react to the series of statements in a similar way. One of the most popular groupings, values and lifestyles classifies people into one of nine lifestyle segments (Bareham, 1995:160). The combination of psychographic profiles together with demographic data has allowed market researchers

and hence manufacturers to more precisely target market niches, and has enabled their advertising to capitalize on emergent social values (Bareham, 1995:163).

The behavioural intention model is more specifically concerned with measuring attitude towards a potential behaviour and the strength of reaction expected from people important to the respondent (Bareham, 1995:175; du Plessis & Rousseau, 1995:80). In combination, these two measures give a much better prediction of eventual behaviour. The reason is the focus is on attitude towards a potential behaviour, which in turn is close to the target behaviour. It suggests attitude measures are only predictive of actual behaviour if what they measure is very precisely focused on the failure of market research, which measures general attitudes in an attempt to measure buying behaviour towards new products. Actual purchase on the other hand is a relatively good predictor of repeat purchase (Bareham, 1995:177; du Plessis & Rousseau, 1995:80). Consumers

suggest that self-interest, benefits of exchange and constraining forces of competition all influence their beliefs and attitudes (Bhaskaran & Hardley, 2002:602). Furthermore consumer self-interest motivates behavioural changes (Rothschild, 1999:24).

#### **2.3.4 Marketing influences**

The retail environment provides a complex but important stimulant to consumer buying behaviour (Bareham, 1995: 181). The food shopping environment within the store has a considerable impact on purchases. A decrease of sales will take place in a crowded shop. Time pressure will cause the consumer to rely on experience and memory and stick to recognized brands. Consumers are not consistently loyal to one store but shop from amongst a limited set of favourites (Bareham, 1995:184; Du Plessis & Rousseau, 1995:81). Stores are usually laid out so as to encourage consumers to pass the maximum number of items. Stocking and the shelf position allocated to items is related to the pattern of sales (Bareham, 1995:185). Innovation in computer technology mean sales information will trigger restocking. There is evidence that supermarkets have innovated

with the products offered reacting to consumer demand for fresh produce, exotic items and less unnecessary packaging (Bareham, 1995:188).

### **3. THE SOYBEAN**

Soybeans were one of the first pulses cultivated by man. The soybean undoubtedly originated in the Orient, probably China. As early as the sixteenth century, it was exported from Eastern Asia to Europe. Soybeans were first introduced into the USA in the early 1800s but remained a minor curiosity until the twentieth century, when some farmers started to grow them as a hay crop. They were first cultivated in South Africa in 1903 at Cedara in Natal. It was not until after 1945 that their value as a supplier of feed and food oil was recognised and exploited. In South Africa a genetically improved soybean with increased pest resistance has just been introduced. Soy products are a component of more than 20 000 foodstuffs and so genetically modified soy could have an overwhelming effect on the food market (McGill, 1997:14).

Soybeans and soy products have been used as a staple and highly nutritious food source for centuries in Eastern Asia. The protein in soy supplies all nine essential amino acids humans need for a healthy diet and provides many functional benefits to the food processors. The ingredients in soy promote moisture and flavour retention, aid emulsification, and also enhance the texture of many foods from a variety of meats to peanut butter, frozen desserts and even cheese (Riaz, 2002:2).

Concentrated and isolated soy proteins are easily digested by humans and equal the protein quality of milk, meat and eggs. Soy proteins are acceptable in almost all diets, containing virtually no cholesterol and being lactose-free (Riaz, 2002:2). Cholesterol levels may be reduced by soy (Sijtsema *et al.*, 2002:565). Seeing that consumers believe that foods contribute directly to their health (Van Kleef *et al.*, 2002:93), soy may be viewed in a positive light as soy protein's nutritional value provides the consumer with a cholesterol free, lower fat alternative to animal protein (Riaz, 2002:2).

The increase in health awareness by consumers also point out important new opportunities for manufacturers. South African producer, Specialized Protein Products Pty.Ltd.'s (SPP) soy ingredients are not only bland and 'non-beany' but absorb the taste characteristics of partially replaced traditional ingredients. The ingredients can be used as effective, economic alternatives in popular preparations and are likely to enhance taste and mouthfeel (Sijtsema *et al.*, 2002:565). SPP technology has unlocked endless opportunities for incorporating soy ingredients into a great variety of foodstuffs, or even effectively replacing or partially replacing traditional ingredients, without reducing nutritional values, by eliminating the "beany" taste so typical of earlier processes. In food marketing, taste is very important and SPP soy ingredients meet consumer taste expectations (Sijtsema *et al.*, 2002:565). Over the past 25 years data has indicated that the inclusion of soy protein in the human diet may provide cholesterol and triglyceride lowering benefits to certain individuals who are hypercholesterolemic. Despite the beneficial nature of soy protein, it has received attention as a protein supplement or as an animal protein replacement primarily in Oriental diets. Soy-based foods marketed in the USA in the 1970s, were considered to have unacceptable flavour and texture. The new generation of soy products most of the objectionable flavour and texture have been removed, but negative impressions are hard to overcome. However, with the USA consumers being more health conscious in the 1990s, perhaps vegetable proteins and their food products will take their place as potential disease-preventative, functional foods for the future (Marshall, 1994:255).

Among the benefits of soya protein are the good water and fat binding abilities afforded by the soluble proteins which this material contain. Soybeans also contain about 20% oil and is very desirable because it contains a large proportion of unsaturated fatty acids (Reichert, 1991:3). Increased yields of soya, coupled with advances in processing proteins from the soybean, have improved the opportunity for the further use of soy-protein-based foods in the human diet. Nutritional experts recommend increasing the relative contribution of plant foods to western-type diet to improve long term health. Therefore, it is important to consider the nutritional qualities of various soy-protein foods for human beings because there may not be a general appreciation for their excellent

nutritional characteristics and potential for meeting the physiological needs of human beings at various ages (Young, 1991:830).

The provision of soy-protein-based foods is one strategy for combating protein-energy malnutrition that affects 50% of the world's population. Mine-workers and agricultural fields require high-energy balanced diets. South Africa, at present, due to widespread poverty, faces the important issue of under-nutrition. Food scientists could perhaps deepen their knowledge and understanding of the cultural and socio-economic diversity of the country's people to meet the demands of a changing society as far as nutrition is concerned. Also, a large proportion of our population are vegetarians because of their lifestyle or religious beliefs (Draper *et al.*, 1993:6). Draper *et al.* (1993:7), suggested that such consumers need appropriate dietary supplements. Soy products can provide a solution to combat problems of malnutrition and dietary supplementation. In spite of the Western world's scepticism to soy products, there is an increasing number of soy products being introduced commercially onto the South African markets (Penstone, 1996:5). The importance of protein in developing countries will be discussed in further detail.

#### **4. SOY AS SOURCE OF PROTEIN**

The Food - Based Dietary Guidelines (FBDG) for South Africa consists of 10 short, clear and simple messages which have been tested for comprehension, appropriateness and applicability. The guidelines are:

- Enjoy a variety of foods;
- Be active;
- Make starchy foods the basis of most meals;
- Eat plenty of fruit and vegetables;
- Meat, fish, chicken, milk and eggs can be eaten every day;
- Eat fats sparingly;
- Use salt sparingly;

- Drink lots of clean, safe water;
- If you drink alcohol, drink sensibly.

It is recommended that the guidelines form the basis of nutrition education in South Africa (Vorster *et al.*, 2001:S3). The health benefits of legumes have been known for centuries. Legumes have been used as a dietary staple, long before modern nutrition researchers endorsed their significant health virtue. The guideline 'eat dry beans, peas, lentils and soy regularly' aims to improve the overall health of South Africans. Legumes fit naturally into the FBDG for South Africa's guidelines to 'eat more starchy foods' (Venter & van Eyssen, 2001:S32).

How do we as nutritionists encourage people to alter their consumption patterns and consume an unfamiliar food that could eliminate a key nutritional deficiency such as protein? During World War Two, American citizens were encouraged to incorporate protein-rich organ meats into their protein-deficient diets. The attempt to change their consumption behaviour were rejected because both the preparation and the taste of organ meats were unfamiliar. Today, the protein-deficiencies throughout the world could be inexpensively reduced with soy protein, it is widely rejected because the preparation and the taste of soy is unfamiliar to consumers (Wansink *et al.*, 2005:265). Soyfoods fit the guidelines for a health promoting diet, specifically soy beans contain high quality protein and make an excellent substitute for animal foods. Soyfoods and soy products are amazingly versatile and can easily be incorporated into a varied diet (Messina *et al.*, 2002:S550).

Soyfoods which are a good source of protein, fit the dietary guidelines for reducing cancer risks, and they also contain anticarcinogens which may prove to be protective. Epidemiological studies show that populations which consume a typical Asian diet have lower incidences of breast-, prostate-, and colon cancers than those consuming a Western diet. The Asian diet includes mostly plant foods, including legumes, fruits and vegetables, and is low in fat. The Japanese have the highest consumption of soyfoods (Messina *et al.*, 2002:S548). On the other hand, the typical Western diet includes large

amounts of animal foods, is lower in fiber and complex carbohydrates, and is high in fat. Soyfoods are dietary staples in the Orient, but are not commonly included in the Western diet. Japan has a very low incidence of hormone-dependent cancers. The mortality rate from breast and prostate cancers in Japan is about one fourth that of the United States (Messina *et al.*, 2002:S548).

Foods rich in protein tend to be rich in saturated fats. Therefore, it is not surprising to find correlations between animal-protein intake and heart disease. When animal protein is substituted by soy protein, it could lower blood cholesterol. Research show that the amino acid homocysteine may be an independent risk factor for heart disease. Men with elevated homocysteine were three times as likely to have heart attacks (Whitney *et al.* 1998:202).

Proteins in foods do not become body proteins, but supply the amino acids from which the body makes its own proteins. If a person eats foods containing protein, enzymes break the long polypeptide strands into shorter strands, the short strands into tripeptides and dipeptides, and finally, the tripeptides and dipeptides into amino-acids (Whitney *et al.* 1998:184). Cells link amino acids end to end in a virtually infinite variety of sequences to form thousands of different proteins. Each link connecting one amino-acid with another amino-acid is a peptide bond (Whitney *et al.* 1998:182). The ingestion of amino-acids, peptides, and proteins from a variety of food sources is essential for maintaining health. Humans use protein mainly for its amino acid content. Nutritionally, only the essential amino-acids are required from exogenous sources. The other amino-acids can be synthesized *in vivo*. Depression of food intake and retardation of growth can be the cause of inadequate levels of essential amino-acids. These consequences may be seen among the world's poor where protein deficient diets are common (Marshall, 1994:242). Soy beans is a world-wide source of major nutrients required for normal diets. Annual global production is currently 88 million metric tons. As much as 45% of the dry matter is protein and the amino-acid pattern approaches the optimum by the Food and Agriculture Organisation (Phillips, 1997:63).

Protein is indispensable to life. Protein deficiency can have devastating effects on people's health, but protein in excess can also be harmful. When people are deprived of energy and protein, the result is protein-energy malnutrition (PEM). PEM strikes early in childhood but can also affect adults. PEM is the most widespread form of malnutrition in the world today, afflicting over 500 million children (Brown, 1990:40). Inadequate food intake leads to poor growth in children and to weight loss and wasting in adults. Children who are thin for their height may be suffering from acute PEM (recent severe food deprivation), whereas children who are short for their age have experienced chronic PEM (long-term food deprivation) (Whitney *et al.* 1998:198). It is easy to overlook PEM in a child because a small child may look normal, but it is the most common sign of malnutrition. PEM is most prevalent in Africa, Central America, South America, the Middle East and East and Southeast Asia (Wolgemuth, 1992:836).

Protein is indispensable to life and thus an important consumer need. The acceptance of different protein sources may vary, thus consumer acceptance will subsequently be discussed in further detail.

## **5. WHAT IS CONSUMER ACCEPTANCE?**

Since the ultimate target of the food industry is the satisfaction of the consumer, it is essential to consider not only the objective consumer needs (e.g. nutrition and safety), but also subjective aspects of consumer satisfaction (e.g. sensory properties), (Karel, 2000:56). Needs can be defined as any physical or emotional body requirements. A consumer's needs are forces directed to specific goals that can be achieved by purchase behaviour (Du Plessis & Rousseau, 1995:80).

Consumer food acceptance denotes the consumption accompanied by pleasure. This emphasizes that, unlike consumption, acceptance is comprised of both an attitudinal and a behavioral component, the pleasure inherent in it. These days food acceptance is treated as a perceptual/evaluative construct. It is a feeling, emotion, or mood with a defining

pleasant or unpleasant character. Measurement of food acceptance relies on the use of psychometric, psychophysical, and/or behavioral methods (Sijtsema *et al.*, 2002:275). Food acceptability, a common dependent variable in food science experiments, is usually measured on the nine-point hedonic scale of food liking of which the extreme end points are “like extremely” and “dislike extremely” (Garber *et al.*, 2001:26). The sensory attributes of a food product interact with consumer physiological, behavioural and cognitive factors within the consumer experience to exert influence on consumer perception. Context and background also affect this interaction e.g. cultural setting and psychosocial influences in which the consumers encountered the food product which also effect the consumer hedonic response, i.e. the consumer’s individual feeling of like or dislike. Hedonic and sensory experience interact with postconsumptional experiences to produce responses that feedback into the consumer physiological state (Imram, 1999:225). Likes, dislikes and preferences, including their consequences on purchasing behaviour and consumption, represent further critical aspects of food acceptability (Harper, 1988:491).

Certain studies have shown that product improvement can increase the acceptance and consumption of a product for an institutional or non-institutional market. As further improvements are made in products one can reach the limits of product improvement through changes in product design aimed at increased acceptance (Meiselman *et al.*, 1988:83). In a study done by Wansink and Cheong (2002:277), it is reported that a taste-related preference for soy can be a learned preference. That is, given the right circumstances (a great cook), the taste of soy can be one that people learn and grow to like.

## **6. CONSUMER PERCEPTION TOWARDS NUTRITION**

According to Schiffman & Kanuk (1997:146), perception can be defined as the process by which an individual selects, organizes and interprets stimuli into a meaningful and coherent picture of the world. Perception is becoming aware of something via the senses,

a way of conceiving something (Hyperdictionary, 2004). The study of perception is the study of what we subconsciously add to or subtract from raw sensory inputs to produce our own private picture.

Little information has been published on the food habits, eating patterns and nutritional perception of South Africans. In a study done among American consumers, it is claimed that they read nutritional fact panels and that they based food purchase decisions on nutritional information. Further probing suggested that this information search was limited to identifying the content of fat, sugar, salt or calories, not any other nutritional information. Consumers with known health problems had become more informed and searched for specific nutritional information. For example, those with high cholesterol and with heart disease sought out cholesterol free and low fat foods (Bhaskaran & Hardley, 2002:596). Consumers, particularly in the older age class, demonstrated elementary knowledge of diet-health relationships and the need to systematically manage dietary habits. Consumers indicated that the most trusted sources of advice on nutrition and diet-health relationships are doctors, dieticians, educational institutions and family members. The basic knowledge on diet and healthy eating came from their mothers and from school (Bhaskaran & Hardley, 2002:599). Interest in functional foods among consumers in the United States of America (USA), has followed the upswing in interest in physical fitness and overall physical well-being. An increasing demand for products that claims to be of natural origin closely follow existing trends in Europe and elsewhere (Gardner, 1994:468). One of the largest trends that has been gathering momentum in the USA is an increasing awareness of the role of diet and proper nutrition to maintain health and prevent disease (Childs & Poryzees, 1997:433). However, Nyaga (2000:98) reported that males are less likely to perceive nutrition as important when food shopping than females. Numerous studies linking diet and health have been published over the past years and consumers are demanding more information on how to achieve health benefits through food and vitamins (Childs & Poryzees, 1997:433).

## 6.1 Consumers' perception of soy and soy products

According to a nationwide telephone survey in the United States of America, consumers are increasingly interested in soy products. Twenty four percent indicated that they use soy products once a week or more. Fourteen percent of the consumers believe soy reduces the risk of heart disease and 10% believe soy lowers cholesterol levels. The FDA (Food and Drug Administration) has approved a health claim supporting the association between diets high in soy protein (25 grams of soy protein/day) and a reduced risk of cardiovascular disease (Weitz *et al.*, 2002:27).

Since World War II, America's armed forces have done comprehensive studies on the food habits and food preferences of servicemen. However, little information in this regard is available in South Africa. The only South-African study that could be found on consumers' preferences regarding soy products, was that conducted by Viljoen and Gericke, where Whites rated soybeans as a low-preference item and the Coloureds rated soy-beans as neutral preference item. Twenty-five percent of the white participants indicated that they "extremely dislike" soybeans and intended never to eat them, whereas 30,2% of the coloured group indicated that they would eat soybeans often (Viljoen & Gericke, 2001:7). American consumer interest in soymilk has heightened since the inception of the 'health claim' legislation regarding soy in October 1999. According to current South African food legislation, it is necessary to list soy as an ingredient in food products (Hinze *et al.*, 2004:41). According to a study done by Wansink *et al.*, (2005:264), the level of nutritional knowledge about soy did not necessarily influence how much people liked soy but was related to how much people consumed soy. In particular, consumers who were able to link attribute-related knowledge about soy to consequence-related knowledge about consuming soy were much more likely to consume soy than were those who only had one type of knowledge. Therefore, nutritional knowledge most likely correlates with consumption when people have attribute-related knowledge of the food and consequence-related knowledge of how it will benefit them. It is not the amount but the type of knowledge that matters (Wansink *et al.*, 2005:265). Increasing consumer awareness of soy as a healthy food ingredient has led to a

tremendous growth in sales of soy isoflavone-enriched foods and dietary supplements in the past three years (Uzzan & Labuza, 2004:R81).

## **6.2 Consumers' perception of soy as meat substitute**

Health conscious consumers and vegetarians have known for years that foods rich in soy protein offer a good alternative to meat, poultry, and other animal-based products. The research to date has examined dietary soy in the form of whole foods such as tofu, or as soy protein added to foods, while the public health community mostly concurs that these whole foods can be worthwhile additions to a healthy diet. Although soy may seem like a new and different kind of food for many Americans, it is actually found in a number of products already consumed (Henkel, 2000:15). Soy products are used in infant formulas, hypo-allergenic foods and vegetable mixtures mainly because of their good protein quality (Torun, 1981:460). Among the benefits of soy protein, are the good water and fat binding abilities afforded by the soluble proteins which this material contains (Reichert, 1991:3).

In a study done by Viljoen and Gericke, toppers (textured vegetable protein dish) was indicated as unknown by 31,71% of the coloureds enlisted in the South African Army between 1993 and March 1994. White and coloured servicemen evaluated this item as low-preference item. Half or more than half of the participants were neutral towards or did not like textured vegetable protein dishes. Thirty percent of the white participants indicated an intended frequency of use as "never", whereas 45,7% of the coloureds did not indicate an intended frequency of use for these items. The results confirm a fact that textured vegetable dishes is not popular among the South African population (Viljoen & Gericke, 2001:2).

## 7 FUNCTIONAL FOOD

Belief in the medicinal power of foods is not a recent event. While Hippocrates may not have started this movement, he proclaimed almost 2,500 years ago to 'Let food be thy medicine and medicine be thy food.' Today, while such a statement might result in severe reprimands, if not litigations, these penalties have not deterred consumers from seeking the health benefits of foods. Increasingly, scientists are being charged with the responsibility of clarifying the role that foods play in maintaining and promoting health. (Milner, 1998:24).

The health benefits of food have never before been so strongly focussed on. The philosophy that food can be 'health promoting' beyond its traditional value is gaining acceptance among scientists. Currently, there are several definitions for functional food, as discussed below. According to the International Life Science Institute (ILSI) of North America, functional foods are foods that, by virtue of physiologically active food components, provide health benefits beyond basic nutrition (Anon, 1995:493; Benadé *et al.*, 2000:34). It is believed that encouraging the consumption of soybeans which contain these components, is likely to help ensure a healthier population (Benadé *et al.*, 2000:34). The Food and Nutrition Board (FNB) of the National Academy of Sciences defines a functional food as one that encompasses potentially healthful products, including 'any modified food or food ingredient that may provide a health benefit beyond that of the traditional nutrients it contains (Milner, 2000:1655S). The International Food Information Council (IFIC) defines functional foods as foods that provide health benefits beyond basic nutrition. (Thomson *et al.*, 1999:1278)

Functional foods, which offer additional nutritional or health benefits to the daily diet, became popular in Japan. The Japanese government is concerned about the aging of the country's population and the resultant cost of healthcare (Ichikawa, 1994:454). Japan is currently the world leader in the development of functional foods. In Japan functional foods are considered as a major new product opportunity, a new dimension of a wide range of food and drink products (Potter, 1990:32). In Australian supermarkets an

increasing range and volume of products with health claims are appearing, thus suggesting trends in the USA are being replicated in Australia. Consumer beliefs, attitudes and responses to the consumption of functional foods are changing. This has an impact on the food industry and would influence company-level product development and marketing strategies (Bhaskaran & Hardley, 2002:592).

Development of functional food products will continue to grow well into the 21<sup>st</sup> century as consumer demand for these products is heightened. Factors contributing to this reshaping of the food supply include:

- an aging population,
- increased health care costs,
- self-efficacy and autonomy in health care,
- advancing scientific evidence that diet can alter disease prevalence and progression, and
- most importantly, changes in food regulation (Thomson *et al*, 1999:1279).

Consumers have demonstrated their expectations of and interest in functional foods as a further means to take their health into their own hands. It is essential to establish reliable mechanisms for obtaining and communicating the information needed by the consumers to make choices about their diet and to have realistic expectations of the health benefits to be derived from functional foods (Howe, 2000:S108).

Soybeans, which can be seen as an excellent example of functional food because it contain physiological active components, will be discussed in further detail.

## **8. SOY AND SOY PRODUCTS**

Soyfoods can take the place of the more allergenic foods, such as cow's milk and eggs. However, some people are also allergic to soy. Those who are allergic to soy may be able to tolerate some soyfoods but not others. It is very important for these people to read

food labels and familiarize themselves with the ingredients. Children often outgrow their allergies within a few years. The most common food allergies are to cow's milk, eggs, peanuts, and fish, although any food can be potentially allergic. The best treatment for food allergy is complete avoidance of the allergenic food (Bianco, 1998:20). According to a study done by Yman (2004:354) to detect the inadequate labeling and contamination as causes of allergic reactions to food, ingredients in food was inadvertently consumed. The largest number of cases is caused by milk, followed by tree nuts, peanuts and eggs. However, the most severe reactions were caused by peanuts and soy, followed by hazelnuts and milk. Soy has caused severe anaphylactic reactions leading to death in peanut allergic individuals consuming meatballs, hamburgers and kebab containing high amounts of soy protein.

Alternative foods must be found to provide the missing nutrients. Identifying alternative foods is especially crucial in the case of young children because they are in a phase of rapid growth and development. Soybased infant formulas have been used since 1929 to feed infants with cow's milk protein allergies. Today's soy formulas are equivalent to cow's milk formulas in digestibility, nutrition profile, and acceptability. In healthy infants, soy formulas promote normal growth, nutritional status and bone mineralization (Bianco, 1998:20).

Food allergy denotes untoward reactions to foodstuffs involving the immune system. The reaction usually involves a protein component of the food. Addendum C contains a list of South African soy products and their allergens (Bianco, 1998:20).

Soybean protein products are available in various forms in South Africa. Soy flour is made from dehulled soybeans that contain the oil normally present in this product. However, soy flour is more commonly prepared by grinding soy flakes from which soybean oil has been pressed. When soluble carbohydrates are extracted from defatted soy flour, soy protein concentrate is produced. This product contains 70% or more protein. On further removal of non-protein substances, isolated soy proteins remain. This product contains 90% or more protein. These soy products are used for various

purposes in food processing (Addendum B) (Bennion, 1990:307). Some of the most important or well known soy products will subsequently be discussed.

### **SOY MILK**

Soy milk is made from yellow soybeans that have been soaked, then ground with water, boiled and filtered. It contains half the fat (some of which is polyunsaturated) but only one fifth the calcium of cow's milk. It is a good milk substitute for people with lactose intolerance. Full-fat and reduced-fat, flavoured and powdered versions are now widely sold. Soymilk can be used as a milk substitute in ice creams, sauces and soups (Rogers, 1990:380).

### **SOYBEAN OIL**

Soybean oil is used as cooking oil and in the manufacturing of margarine and shortening. It is low in saturated fats and has a high smoking point, so is a good frying oil (Rogers, 1990:380).

### **SOY FLOUR**

Soy flour is finely ground flour used to thicken sauces and added to cakes, biscuits and muffins as a flavour enhancer as it is high in fat. Sometimes used in bread-making as a bread improver. It contains no gluten but is high in protein (Rogers, 1990:380).

### **SOYBEAN PASTE**

This paste is made from fermented yellow, brown, black or red beans and used as a flavouring in Asian cooking (Rogers, 1990:380).

### **SOYBEAN SPROUTS**

These sprouts is the most nutritious of all sprouts. The beans are soaked for 10 hours and take 3 to 4 days to fully germinate. This can be used raw, steamed or in stir-fries (Rogers, 1990:380).

## **TEXTURISED VEGETABLE PROTEIN**

Textured vegetable protein (TVP) is a manufactured plant protein. The protein is extracted from vegetables, usually soybeans, which are made into a paste, then coloured and shaped to produce a product that has a similar texture to meat. TVP was originally marketed as a high-protein food for vegetarians but is increasingly used as an extender in processed foods such as sausages. TVP is sold in dried granules, which, when reconstituted, look and can be used like minced meat, or formed into a solid mass and shaped into 'steaks', or cubed and sold in tins or packets. TVP may be sold mixed with added flavourings to give it a meat-like flavour (Rogers, 1990:434).

Concentrates and soy flour may be further processed by thermoplastic extrusion to impart meatlike texture to these products. The concentrates and flour are mixed with additives and water to form a dough and extruded under high temperature and pressure to obtain fibrous texture. Soy isolate may also be textured by a spinning process that involves solubilizing soy isolate in alkali and then forcing it through a spinnerette into an acid bath to coagulate the proteins. The fibres that are formed are stretched and combined into bundles or tow. The tows are used to produce meat analogs (Liu, 1997:389).

Meat alternatives made from soybeans contain soy protein or tofu and other ingredients mixed together to simulate various kinds of meat. These meat alternatives are sold as frozen, canned or dried foods. Usually, meat alternatives can be used the same way as the foods they replace. With so many different meat alternatives available to consumers, the nutritional value of these foods varies considerably but are generally low in fat. Meat alternatives made from soybeans are excellent sources of protein, iron and B vitamins (U.S. Soyfoods Directory). Soy protein ingredients are also used in meat products as extenders. Soy has excellent economic and nutritional value and soy protein imparts various functions in meat-based products, including emulsification, gelation, adhesion, fat- and water-binding ability, and cohesion. Textured soy flours and concentrates are used as extenders in chopped meats. Soy isolate are used in meatballs, ground meat, frankfurters and bolognas to improve texture. Products that are known as textured soy

proteins have fibre or chunk structures, which resemble meat and seafood in texture and chewiness upon hydration. Their major application is meat analogs (Liu, 1997:421).

### **SOY-BASED MEAT SUBSTITUTE PRODUCTS**

Soy-based meat analogs come in various forms. They mimic burgers, meatballs, chicken nuggets, ham or bacon crumbles, breakfast sausages, stir-fry products, whole muscle and analogs. These products can be classified into two categories, one is meat-and-sauce type, such as chili or stewlike blends, and the other is the patty or burger-type (Liu, 1997:424).

## **9. INFLUENCE OF HEALTH CLAIMS ON CONSUMER PERCEPTIONS AND BEHAVIOUR**

The Food and Drug Administration (FDA) gave food manufacturers permission (October 1999) to put labels on products high in soy protein indicating that these foods may help lower heart-disease risk. This health claim provides consumers with solid scientific information about the benefits of soy protein. Health claims encourage food manufacturers to provide healthful products. All foods, including soy, are complex collections of chemicals that can be beneficial for many people in many situations, but can be harmful to some people when used inappropriately. Here lies much scientific dilemma. When does data show that there could be problems or that food is safe? Foods rich in soy protein can have considerable value to heart health, a fact that is backed by dozens of clinical studies. The FDA allow a health claim on food labels stating that a daily diet containing 25 grams of soy protein, low in saturated fat and cholesterol, may reduce the risk of heart disease (Taylor *et al.*, 2002:1). This health claim for soy protein appears to have succeeded in rising interest in soy products among consumers (Henkel, 2000:15).

According to Bhaskaran and Hardley (2002:597) American consumers claimed that they did not believe manufacturers' claims and they indicated that they took cognisance of what

was printed on packaging and the advertising messages and this suggests that, notwithstanding their comments, manufacturers' claims influenced product evaluation and purchase decision. Consumers, however, reported that they would consider manufacturer claims in their decision process if they were shopping for a product with a health attribute. Sales of soy and soy products are up and are projected to increase due to the FDA-approved health claim. This has also happened before with other health claims (Henkel, 2000:16).

Americans are familiar with the U.S. Department of Agriculture's Dietary Guidelines but seem to have little understanding of how to translate the nutrition guidelines into healthy eating practices (Nyaga, 2000:97).

## **10. CONCLUSION**

Because of the increased interest in soy products and their health benefits, food manufacturers are looking for convenient ways to incorporate soy ingredients into good tasting nutritious foods so that consumers do not have to consume traditional soy foods. Soybeans have great potential for use as human food because of their high level of good quality protein. Soy has been a valuable resource for mankind by providing excellent nutritional properties. The soybean provides one of nature's most powerful answers to many health problems by supplying protein and fibre together with cholesterol-lowering and anti-carcinogenic properties (Riaz, 2002:7).

There is little data on South-African soy consumption. Recent figures from the Department of Agriculture show an increase in soybean production from 154 000 tons in 2000 to 226 000 tons in 2001. The increase in soy production in South Africa does imply that there is a growing market for soy products (Hinze *et al.*, 2004:40). For the future, soy foods sales will probably continue to rise steadily. There is a buzz with soy products that intrigues people and they want to try them. It seems that soy is here for the long run (Henkel, 2000:19).

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**CHAPTER 3**

***ARTICLE***

## **SOUTH AFRICAN CONSUMERS' PERCEPTION OF SOY AND SOY PRODUCTS**

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*Journal of Family Ecology and Consumer Sciences, submitted September 2005*

## Opsomming

Daar word deesdae toenemend op die gesondheidsvoordele van voedsel gefokus. Funksionele voedsel kan gesien word as voedsel wat gesondheidsvoordele bo en behalwe die basiese nutrisionele waarde inhou, as gevolg van aktiewe voedselkomponente soos isoflavone in soja. Verbruikers behoort aangemoedig te word om sojabone te gebruik om die gesondheid van die bevolking te verbeter. Funksionele voedsel soos sojaprodukte word dus tot 'n groter mate ernstig as 'n nuwe produkontwikkelingsgeleentheid vir die voedsel industrie oorweeg.

Bepaalde inligting is beskikbaar oor die Suid-Afrikaanse verbruikerspersepsie van soja en soja produkte. Die doel van hierdie studie is dus om Suid-Afrikaanse verbruikers se persepsie van soja en sojaprodukte te bepaal. Respondente (n=3001), 16 jaar en ouer is ewekansig uit nege metropolitaanse (n=1997) en plattelandse (n=1004) gebiede in Suid Afrika gekies, verteenwoordigend van die vier hoof rasse-groepe (Blankes, Swartes, Kleurlinge en Indiërs). Manlike en vroulike respondente is in die studie ingesluit (50/50). Data-insameling is deur middel van vraelyste, bestaande uit 17 voedselverwante afdelings elk met onderafdelings, gedoen. Vier van die 17 voedselverwante afdelings het inligting oor soja, sojaprodukte en die gesondheidsvoordele daarvan bevat en is in hierdie studie gebruik. 'n Sub-dataset (n=2437) is vanaf die oorspronklike dataset (n=3001) saamgestel, wat slegs dié respondente (81%) ingesluit het wat al voorheen van soja gehoor het. Hierdie sub-dataset is vir verdere statistiese analise gebruik. Die populasiegroep is vermenigvuldig met 'n spesifieke gewegde factor, wat vooraf statisties deur Markinor bepaal is, om elke rasse-groep se bydrae tot die gewegde Suid-Afrikaanse populasie te bepaal.

Geen praktiese betekenisvolle verskille in persepsies van metropolitaanse en plattelandse verbruikers is gevind nie. Swartes en Indiërs in Suid-Afrika hou meer van die smaak van soja as Blankes en Kleurlinge, terwyl Blankes ook 'n negatiewe persepsie van die smaak van soja het. Die resultate van die studie dui daarop dat Swartes en Indiërs in Suid-Afrika meer soja as Blankes en Kleurlinge gebruik. Swartes sal, in teenstelling met

Blankes, meer soja gebruik indien dit meer geredelik beskikbaar is en daar 'n groter produkverskeidenheid is. Blankes gebruik minder soja as enige van die ander rassegroepe. Volgens die resultate sal selfs die beskikbaarheid van 'n groter verskeidenheid soja produkte in die mark steeds nie die gebruik van soja deur Blankes en Indiërs beïnvloed nie. Indiërs en Blankes was meer bewus van vleisvervangers wat van soja vervaardig word.

Groot praktiese betekenisvolle verbande is tussen verbruikers se persepsie teenoor sekere stellings en die verskillende rassegroepe, onderskeidelik gevind. Daar is gevind dat die grootste betekenisvolle verskille tussen Blankes en Swartes was. Verdere navorsing behoort op Suid-Afrikaanse verbruikers se persepsies van soja gedoen te word, en resultate behoort aan Suid-Afrikaanse verbruikers en die industrie beskikbaar gestel te word. Bemarkers van soja en sojaprodukte moet op die groepe wat die meeste van soja se smaak hou en wat dit meer gereeld gebruik, fokus.

**Sleutelwoorde:** Soja, sojaprodukte, verbruikerspersepsie, gesondheidsvoordele, funksionele voedsel

## **Abstract**

Food that provide health benefits beyond basic nutrition, by virtue of physiologically active food components are known as functional foods. Soybeans contain some of these phytochemical components such as isoflavones. Due to the lack of relevant data, the aim of this study was to assess South African consumers' perceptions towards soy and soy products. Respondents (n=3001) were randomly selected from 9 metropolitan as well as rural areas in South Africa by Markinor. The questionnaire consisted of 17 food related topics. Four of these sections (which were also used in this study) probed information on soy and soy products. The data of 81% respondents (n=2437), who were aware of soy, were used for further statistical analyses. There were no practical significant difference between rural and metropolitan respondents' perceptions regarding each statement. Large practical significant differences were found between racial groups regarding most of the statements. In general Blacks were more positive towards the use and taste of soy, as opposed to Whites. More Indians were aware of meat substitutes made from soy than the other racial groups. Marketing efforts in South Africa should focus on those groups that like the taste of soy best and would consume soy regularly.

**Key words:** Soy, soy products, consumer perception, health benefits, functional food

## INTRODUCTION

The health benefits of food has never before been focussed on so strongly. Foods that provide health benefits beyond basic nutrition, are known as functional food. Soybeans, considered a functional food, are unique among the legumes because they are a concentrated source of isoflavones (Messina, 1999:439S). However, the wider appreciation of both the functional and nutritional properties of soy proteins has taken time to establish after negative consumer reaction to many of the products which have been introduced since the Second World War, and more recently during the 1970s. The first generation of post-war consumers had a bias towards soy and its products (Tuley, 1996:24). Part of the population will adopt new foods into their regular diet simply because they are a healthy alternative, but a much larger percentage will do so only if the taste of the product is equal or more preferable to what is currently being eaten (Wansink & Cheong, 2002:276).

Although soybeans and soy products have been used as a staple and highly nutritious food source for centuries in Eastern Asia (Young *et al.*, 1984:18), it is still widely overlooked because of its unfamiliar taste and texture (Wansink & Cheong, 2002:276). Soy is a low-cost, highly available protein source (Barnes, 1998:387). The problem, however, lies in encouraging acceptance among those who are hesitant about, or resistant to consume soy (Shork, 2000:14).

According to Schiffman & Kanuk (1997:146), perception can be defined as the process by which an individual selects, organizes and interprets stimuli into a meaningful and coherent picture of the world. Perception is becoming aware of something via the senses, a way of conceiving something (Hyperdictionary, 2004). The Oxford dictionary defines perception as 'to take in or apprehend with the mind or senses' (Oxford English Dictionary, 1974:902).

If it could be determined what part of the population consume soy and like the taste of soy, this marketing segment can focus on a specific group of soy consumers. Product development of more acceptable soy products can also be focused on certain soy consumers. There is, however, a lack of information in South Africa on consumer perception of soy.

Therefore, the objective of this study was to assess South African consumers' perception of soy and soy products.

## **MATERIALS AND METHODS**

### **Respondents and questionnaire**

South African respondents, representative of the four main racial groups of South Africa (Whites, Blacks, Coloureds and Indians) were selected by stratified random sampling from nine metropolitan (n=1997), as well as rural areas (n=1004) in South Africa. The total sample size, of the metropolitan and rural subjects, also representative of both genders (50/50 split), was 3 001 adults ( $\geq 16$  years). The racial split of the sample is an accepted sampling size that allows for analyses and an acceptable sample error. The sample was based on the 2000 census data of South Africa and was stratified to ensure that the sample is representative of the South African population and that the results can be extrapolated to reflect the adult metropolitan and rural population based on gender, age, LSM and racial distribution.

The sample was stratified by province and within province, by community size, city, township and suburb. Within each group, sampling points were determined by a systematic random selection, based on cumulative population figures per group.

A starting point per sample point was selected at random. A low integer was randomly selected and the first interview took place at the house with the lowest number ending in the low integer. Every third household was chosen until a cluster of 5 was completed. When there was more than one household on a stand, one was randomly selected. Within a household all qualifying members of the household were listed and the qualifying respondent determined by a random selection grid. Every effort was made to interview this individual. If this was impossible after three calls (including weekend and night calls) or if the individual refused to participate, another individual of the same gender, age, and working status, living in the same street, was selected to be interviewed. The face-to-face interview was carried out in the respondents' home, in the preferred language of the respondent

Of the total sample of 3001, a sub-dataset was created, which included only those respondents (81%), that have heard of soy before (n=2 437) and this was used for further statistical analyses in the present study. This sub-dataset of respondents that have heard of soy before, was used for further statistical analysis. The population group (n=2437) was multiplied by a specific weighed fraction, as statistically determined by Markinor, in order to calculate the contribution of each racial group to the weighed total South African population.

Questionnaires, consisting of 17 food-related sections (with a number of subsections), were developed by nutrition researchers in co-operation with business partners. Four of The 17 food-related sections (27 statements, see Addendum A), contained information regarding soy, soy products and the health benefits of soy. The language of the questionnaire was English, but it was translated into other languages by a translator whose home language matched the one into which the questionnaire was being translated. This version was then re-translated into the base language by someone whose home language was the base language. In this way translation errors could be identified and corrected. Trained field workers of a market research company, named Markinor, administered and counter-checked the questionnaire. These fieldworkers had a minimum of matric education. A minimum 20% back-check, either by personal visit or telephonic

call, was made by the team supervisor to ensure reliability and validity of the data collected by the interviewer.

Markinor collected all the data using random sampling. Random sampling results in every sampling unit in a definite population having a calculable non-zero probability of being selected in the sample. The chance of a unit being included in a sample can be calculated. Random sampling has been widely adopted by leading research bodies because of its sound theoretical basis, which allows the legitimate use of the mathematics of probability. It is the only completely objective method of sampling populations (Chrisnall, 2001:99).

### **Measuring instruments**

To meet the objectives of this study, the following six statements were selected for further statistical analyses from one of the sections on soy, since they were considered most relevant in this regard.

- I don't like the taste of soy
- I eat/ drink soy products
- I would use or use more soy if it was readily available
- I never use soy
- I would use or use more soy if there was a bigger product range
- I am aware of a number of meat substitutes made from soy

The respondents expressed their opinions regarding the above statements on a five - point Likert scale, where 1=strongly disagree, 2=disagree, 3=neutral, 4=agree and 5=strongly agree. If a respondent did not understand or answer a question and therefore had no perception in this regard, his or her response was indicated as "don't know". In the statistical analyses these responses were considered as missing data, which had an influence on the weighed totals of the South African population. The questionnaire was

developed by Markinor which is a leading research institute, therefore the face validity and reliability of the questionnaire was ensured by experts in the nutritional field as well as the authenticity of Markinor who compiled it. Six statements were used to determine the consumers' perception towards soy and soy products. Since these statements were separately analysed, no factor analysis was done on a combination of statements.

## STATISTICAL ANALYSES

Statistical analyses were done with the Statistica®-program (Stat Soft 7, 2005). The data were weighed, so that it would be representative of the total South African consumer population. Statistical analyses were done on the merged data of metropolitan and rural respondents. Age and racial groups were the only two variables used for this study.

Detailed two-way tables were used to determine if any relation was found between the different statements and rural and metropolitan data. It is important to know whether a relationship between two variables is also practical significant. For random samples, the statistical significance of such relationships are determined with Chi-square tests which yielded small p-values in all instances because of the large sample sizes. Actually one wants to know whether the relationship is large enough to be important in practice. In this case the effect size is given by  $w = \sqrt{\frac{X^2}{n}}$ , where  $X^2$  is the usual Chi-square statistic for the contingency table and n is the sample size (Steyn, 2002:6). A relationship with  $w = 0.3$  might be practically significant (medium effect size), while those with  $w \geq 0.5$  is considered as practical significant (large effect size).

In the cases where a possibility of a relationship in two-way tables were found, this relationship was further examined by descriptive statistics. A natural way to comment on the practical significance of the difference between means is to use the standardized difference between the means i.e.

$$d = \frac{|\bar{x}_1 - \bar{x}_2|}{s_{\max}}$$

where  $|\bar{x}_1 - \bar{x}_2|$  is the difference between  $\bar{x}_1$  and  $\bar{x}_2$  without taking the sign

into consideration and  $s_{\max}$  is the maximum of  $s_1$  and  $s_2$ , . The following guidelines can be used for the interpretation of the effect size, namely small effect:  $d=0.3$  ; medium effect:  $d=0.5$  ; large effect:  $d=0.8$  (Cohen, 1988). Data with  $d \geq 0.8$  was considered as practically significant, since it is the result of a difference having a large effect.

## RESULTS

The total number of respondents before the data were weighed were 3001. Eighty one percent (2437) of the 3001 respondents were aware of soy. Statistical analysis of these respondents' data yielded the following results, as set out in Table 1.

Table 1 represents the two-way frequency table of rural and metropolitan respondents on the different statements regarding soy. According to these small effect sizes, it can be concluded that there is no practical significant relationship between rural and metropolitan consumers' perceptions regarding the different statements. Since there were no practical significant relationships between rural and metropolitan data and the six statements respectively, the two separate data sets were merged into one dataset which was subsequently used for further statistical analyses.

Statistical analyses (two-way frequency tables) were done on the six statements regarding soy and the age groups. According to the small effect sizes there were also no practical significant relationship between the six statements and the different age groups. Therefore, the age variable was not used for further statistical analyses.

**TABLE 1: FREQUENCY OF RURAL AND METROPOLITAN RESPONDENTS ON THE DIFFERENT STATEMENTS REGARDING SOY**

STATEMENT		Strongly Disagree %	Disagree %	Neither agree nor disagree %	Agree %	Strongly Agree %	Effect size (w)
1. I don't like the taste of soy	Rural	19,3	36,8	17,8	18,9	7,3	0,21*
	Metropolitan	9,6	31,6	14,9	27,1	16,8	
2. I eat/drink soy products	Rural	14,7	17,0	7,3	37,7	23,3	0,19*
	Metropolitan	22,3	25,5	9,6	30,0	12,6	
3. I would use more soy if it was readily available	Rural	9,0	14,6	22,3	41,7	12,4	0,21*
	Metropolitan	13,1	27,2	24,8	26,6	8,2	
4. I never use soy	Rural	42,7	26,4	6,1	14,7	10,0	0,24*
	Metropolitan	21,7	32,2	5,9	19,8	20,4	
5. I would use/use more soy if there was a bigger product range	Rural	10,9	15,9	25,9	36,9	10,4	0,22*
	Metropolitan	16,4	30,8	20,6	25,7	6,4	
6. I am aware of a number of a number of meat substitutes made from soy	Rural	16,9	23,9	21,4	32,1	5,7	0,19*
	Metropolitan	9,6	18,5	15,7	44,7	11,5	

Effect size : small effect (0,1) = \* ; medium effect (0,3) = \*\* ; large effect (0,5) = \*\*\*

Table 2 represent the results of a two-way frequency table for race and all six statements. The statement with the greatest effect size ( $w=0,48$ ) was 'I never use soy', indicating a practical significant relationship between racial groups and this statement. For easier interpretation of this table, percentages on the five point Likert scale were added together (1=strongly disagree and 2=disagree is disagree) and (4=agree and 5=strongly agree is agree). The data showed that almost 76% Blacks, 68% Indians, 43% Coloureds, and only 25% Whites use soy. A possibility of practical significant relationships (medium effect sizes) exist between racial group and the following statements, 'I would use or use more soy if it was readily available' ( $w=0,41$ ); 'I eat or drink soy products' ( $w=0,39$ ); 'I don't like the taste of soy' ( $w=0,35$ ) and 'I would use or use more soy if there was a bigger product range' ( $w=0,34$ ). Fifty six percent Blacks, opposed to only 15% Whites, would use more soy if it was readily available. Almost two thirds of Indians and Blacks eat or drink soy products, compared to only 22% Whites. Fifty nine percent Blacks opposed to only 21% Whites like the taste of soy. Almost 50% of Blacks would use or use more soy if there was a bigger product range while 64% of Whites would not. Results on the statement 'I am aware of a number of meat substitutes made from soy' (small effect size  $w=0,26$ ), indicates no practical significant relation between race and the statement. More Indians (78%) and Whites (60%) were, however, aware of meat substitutes made from soy than Coloureds (43%) and Blacks (40%). The above mentioned relationships were further examined by means of effect sizes for the difference in 'average perception' towards the statements.

**TABLE 2: TWO-WAY FREQUENCY TABLE FOR THE DIFFERENT STATEMENTS AND RACIAL GROUPS**

STATEMENT	RACIAL GROUPS																					EFFECT SIZE (w)
	WHITE					BLACK					COLOURED					INDIAN						
	1 %	2 %	3 %	4 %	5 %	1 %	2 %	3 %	4 %	5 %	1 %	2 %	3 %	4 %	5 %	1 %	2 %	3 %	4 %	5 %		
1 I don't like the taste of soy	3,7	17,6	15,7	42,2	20,8	19,6	39,1	17,4	15,4	8,5	7,5	29,9	15,3	34,1	13,4	8,1	41,1	10,6	28,7	11,5	0,35**	
2 I eat/drink soy products	31,2	40,6	6,6	15,9	5,7	13,4	13,4	9,5	39,2	24,6	24,8	31,8	5,5	31,2	6,7	13,8	18,9	1,8	50,8	14,7	0,39**	
3 I would use more soy if it was readily available	22,6	42,2	19,8	12,9	2,5	6,9	12,1	24,8	42,2	14,1	12,0	24,8	21,2	37,7	4,4	18,4	37,9	19,1	19,0	5,7	0,41**	
4 I never use soy	9,1	15,8	6,3	38,1	30,6	45,1	30,8	6,4	8,8	8,9	8,8	34,3	4,5	31,3	21,1	25,2	42,3	2,2	16,7	13,6	0,48***	
5 I would use/use more soy if there was a bigger product range	25,1	38,9	19,2	14,4	2,3	9,2	16,1	26,4	37,1	11,2	14,8	25,3	17,6	36,3	6,0	21,6	38,2	14,8	21,3	4,2	0,34**	
6 I am aware of a number of meat substitutes made from soy	10,4	16,8	12,7	52,5	7,5	16,2	21,2	22,7	31,8	8,1	9,2	36,4	11,6	35,8	7,0	2,6	12,8	6,6	62,0	16,0	0,26*	

Five-point Likert-scale : 1=strongly disagree, 2=disagree, 3=neither agree nor disagree, 4=agree, 5=strongly agree

Effect size : small effect (0.1) = \*, medium effect (0.3) = \*\*, large effect (0.5) = \*\*\*

**TABLE 3: MEANS AND STANDARD DEVIATIONS FOR DIFFERENT RACIAL GROUPS REGARDING THE SIX STATEMENTS**

STATEMENT	RACIAL GROUPS											
	WHITE			BLACK			COLOURED			INDIAN		
	N	%	#mean±SD	N	%	#mean±SD	N	%	#mean±SD	N	%	#mean±SD
1. I don't like the taste of soy	2867	17,1	3.58±1.11	11729	69,7	2.54±1.21	1571	9,3	3.16±1.20	652	3,9	2.94±1.22
2. I eat/drink soy products	3190	18,4	2.24±1.21	11719	67,5	3.48±1.35	1796	10,3	2.63±1.32	666	3,8	3.34±1.31
3. I would use more soy if it was readily available	3008	18,0	2.31±1.04	11383	68,2	3.44±1.09	1656	9,9	2.98±1.13	654	3,9	2.56±1.16
4. I never use soy	3242	18,4	3.65±1.31	11867	67,5	2.06±1.29	1798	10,2	3.22±1.34	671	3,8	2.51±1.38
5. I would use/use more soy if there was a bigger product range	3027	18,2	2.30±1.07	11274	67,8	3.25±1.13	1671	10,1	2.93±1.20	663	4,0	2.48±1.17
6. I am aware of a number of meat substitutes made from soy	3025	19,2	3.30±1.15	10395	66,1	2.95±1.22	1638	10,4	2.95±1.17	663	4,2	3.76±0.96

N=weighed sample size, %=percentage of weighed sample size, mean±SD=mean ± standard deviation

# Mean score on 5 point Likert scale

Table 3 represent the means and standard deviations for different racial groups regarding the six statements on soy. It was also determined whether the average perception of racial groups differed significantly in practice from one another regarding each statement. Only those with a large practical significant difference in average perception, will subsequently be discussed. Whites had the highest mean score (3,58) on a five point Likert scale towards the statement 'I don't like the taste of soy'. The Black respondents on the other hand, with a mean score of 2,54 disagreed most, thus Blacks like the taste of soy best. The difference in average perception of Whites and Blacks towards their liking of soy, was of large practical significance ( $d = 0,86$ ).

The Blacks' (mean score of 3,48) and Indians' (mean score of 3,34) perception on the statement 'I eat or drink soy products, indicated that they were relatively neutral to the statement. Whites on the other hand, with a mean score of 2,24 were more likely to disagree with this statement and would thus probably not be consumers of soy products. The difference in average perception of Blacks and Whites ( $d = 0,92$ ) and Whites and Indians ( $d = 0,83$ ) towards eating or drinking soy products, was of large practical significance.

Blacks also had a relatively neutral response (mean score of 3,44) to the statement 'I would use or use more soy if it was readily available'. Whites with a mean score of 2,31, disagreed with this statement and would thus not use or use more soy even if it was readily available. The difference in average perception of Blacks and Whites towards this statement, was of large practical significance ( $d = 1,05$ ).

White respondents (mean score of 3,65) were more likely to agree and Coloureds (mean score of 3,22) were neutral on the statement 'I never use soy', while Blacks (mean score of 2,06) and Indians (mean score of 2,51) on the other hand, tended to disagree on the same statement, indicating that they were more likely to use soy. The difference in average perception of Whites and Blacks ( $d = 1,22$ ), Blacks and Coloureds ( $d = 0,86$ ) and Whites and Indians ( $d = 0,83$ ) towards using soy, was of large practical significance.

Blacks (mean score of 3.25) and Coloureds (mean score of 2.93) had a more neutral response to the statement 'I would use or use more soy if there was a bigger product range', indicating that a bigger product range of soy would not necessarily influence their soy consumption. Whites (mean score of 2.30) and Indians (mean score of 2.48) disagreed on this statement, therefore they would not use or use more soy if there was a bigger product range. The difference in average perception of Whites and Blacks ( $d=0,84$ ) towards using more soy if there was a bigger product range, was of large practical significance.

Of all the racial groups, Indians were more aware (mean score of 3.76) of meat substitutes made from soy while Whites (mean score of 3.30), Blacks (mean score of 2.95) and Coloureds (mean score of 2.95) were neutral towards this statement. This can be an indication that the above mentioned racial groups are not specifically aware or unaware of meat substitutes made from soy.

## **DISCUSSION AND CONCLUSION**

Because of the increased interest in soy products and its health benefits, food manufacturers are looking for convenient ways to incorporate soy ingredients into good tasting nutritious foods, so that consumers do not only have to consume traditional soy foods. Soy have great potential for use as human food because of its high level of good quality protein. Furthermore, soy provides one of nature's most powerful answers to many health problems by supplying protein and fibre together with cholesterol-lowering and anti-carcinogenic properties (Riaz, 2002:7).

Interest in functional foods among consumers in the United States of America (USA) has followed the upswing in interest in physical fitness and overall physical well-being. Soyfood consumption and consumer knowledge of the benefits of soy are increasing each year. An increasing demand for products that claim to be of natural origin, closely follow existing trends in Europe and elsewhere (Gardner, 1994:468). One of the largest trends

that has been gathering momentum in the USA, is an increasing awareness of the role of diet and proper nutrition to maintain health and prevent disease (Childs & Poryzees, 1997:433). Consumers believe that foods contribute directly to their health. This increasing consumer awareness in combination with advances in various scientific domains, provides companies with unique opportunities to develop an almost infinite array of new functional food concepts (Van Kleef *et al.*, 2002:93). Numerous studies linking diet and health have been published over the past years and consumers are demanding more information on how to achieve health benefits through food and vitamins (Childs & Poryzees, 1997:433).

Little information has been published on the food habits, eating patterns and nutritional perception of South Africans. The United Soybean Board of America (USB) distributes an annual National Report regarding consumer awareness and perception towards nutrition. The 2002-2003 National Report stated that consumers' awareness of the health benefits of soyfoods rose significantly in 2002, with 74% of Americans perceiving soy as healthy compared to 69% in 2001. Older Americans are more likely to perceive soy as healthy. In 2002, 41% of consumers confirmed that they are aware of specific benefits of soy in the diet, which is an increase of 2 % since 2001. Awareness of some other health benefits of soy is also on the increase. Consumer's recall on news stories regarding the health benefits of soy has been on an upward trend since 1999, when 42% recalled soy news, as opposed to 53% in 2002. Consumers aged 35 and older are most likely to recall news about soy. Consumers (62%) got their soy information from printed media sources such as magazines and newspapers. The most recent report of 2004-2005 stated that the overall consumer awareness of soy products increased. Soymilk's awareness rating stepped up to 90% while regular use of soymilk held fairly steady at 16%. American consumers (74%) perceived soy products as healthy. More females (44%) than males (28%) stated that soy might provide a healthy addition to their diet. Almost 30% of American consumers stated that they seek out products that specifically contain soy. Thirty one percent of the consumers recognized awareness of specific health benefits gained by including soy in their diet. Most consumers (50%) read about soy health news in magazines and newspapers, while 10% received information from family and friends.

American consumer interest in soymilk has heightened since the inception of the 'health claim' legislation regarding soy in October 1999. According to current South African food legislation, it is necessary to list soy as an ingredient in food products (Hinze *et al.*, 2004:41).

The results of the present study indicate that 81% of the South African consumer population are aware of soy. There was no practical significant differences between the rural and metropolitan population's perception towards the six statements regarding soy used in this study. Furthermore, age had no practical significant effect on consumers' perception of any of the six statements.

In the present study, Blacks and Indians in South Africa like the taste of soy more than Whites and Coloureds. In a study done by Viljoen and Gericke (2001:10), Whites rated soy as a low-preference item while Coloureds rated soy as a neutral preference item. Twenty five percent of the White participants indicated that they "extremely dislike" soy and intended never to eat it, whereas 30% of the Coloured group indicated that they would eat soy often. White and Coloured servicemen also evaluated soy as low-preference items (Viljoen & Gericke, 2001:7). Soy is a low-cost, highly available protein source, yet it is largely overlooked because of its unfamiliar texture and taste (Wansink & Cheong, 2002:276). According to the United Soybean Board of America (2004-2005), 18% Americans indicated that taste prevents them from incorporating soy in their diet.

In the 2003-2004 National Report of the USB it is stated that 42% of Americans consume soy foods once a month or more, while 28% consume soy foods weekly. The regular consumption of soy nuts increased to 6% while fewer consumers surveyed, consume soy burgers. One-quarter of Americans consume soyfoods or soy beverages once a week or more, consistent with the previous year's results. However, respondents who never consume soy products increased to 38%. Among those who do not consume soy, 37% report that nothing in particular prevents them from including soy in their diet. According to a study done by Wansink *et al.*, (2005:264), the level of nutritional knowledge about soy did not necessarily influence how much people liked soy but was

related to how much people consumed soy. In particular, consumers who were able to link attribute-related knowledge about soy to consequence-related knowledge about consuming soy were much more likely to consume soy than were those who only had one type of knowledge. Therefore, nutritional knowledge most likely correlates with consumption when people have attribute-related knowledge of the food and consequence-related knowledge of how it will benefit them. It is not the amount but the type of knowledge that matters (Wansink *et al*, 2005:265). Recent figures from the South African Department of Agriculture show an increase in soybean production from 154 000 tons in 2000 to 226 000 tons in 2001. The increase in soy production in South Africa seems to imply that there is a growing market for soy products (Hinze *et al*, 2004:40). However, there is little data on soy consumption in South Africa. Educating South African consumers about the many benefits of soy and to influence their perception towards consuming soy, may positively increase the number of people who consume soy in South Africa.

According to a nationwide telephone survey in the USA, consumers are increasingly interested in soy products. Twenty four percent indicated that they use soy products once a week or more (Weitz *et al*, 2002:27). According to the National Report of the USB (2004-2005), one in six Americans consume soy once a week or more. Results of the present study indicated that Black and Indian respondents seem to use soy more often than Whites and Coloureds. Opposed to Whites, Blacks also indicated that they would use more soy if it was readily available and if there was a bigger product range. Whites in South Africa seem to consume less soy while a bigger product range of soy would not necessarily influence the soy consumption of Whites and Indians. According to a study done by Viljoen & Gericke (2001:7), half or more than half of the participants were neutral towards or did not like textured vegetable protein dishes. Thirty percent of the Whites indicated an intended frequency of use as “never”, whereas 46% of the Coloureds did not indicate an intended frequency of use for these items. The results confirm the fact that textured vegetable dishes are not popular among the South African population.

The percentage of Americans seeking products specifically because they contain soy increased from 26% in 2001 to 31% in 2002. Women (33%) are much more likely to seek out soy products than men (24%). According to the USB of America's National Report (2004-2005), a new question was added to the survey and revealed overwhelming consumer interest in a ground meat or soy product. Of the 56% who were interested, nearly 70% would prefer beef as the type of meat to blend with soy.

Results from the present study indicated that Indians (78%) and Whites (63%) were more aware of meat substitutes made from soy. In a study done by Viljoen and Gericke (2001:10), Toppers (textured vegetable protein dish) was indicated as unknown by 32% of the Coloureds enlisted in the South African Army between 1993 and March 1994. In contrast, increasing consumer awareness of soy as a healthy food ingredient in the USA has led to a tremendous growth in sales of soy isoflavone-enriched foods and dietary supplements in the past three years (Uzzan & Labuza, 2004:R81).

From the present study, it is clear that South African consumers are aware of soy. The differences in perception regarding soy can however be an indication that soy has a long way to go before it can be a staple in the South African diet. Given the nutrient profile and phytochemical contribution of these beans (DuBois & Hoover, 1981:343), nutritionists should make a concentrated effort to encourage the public to consume beans in general and more soy foods in particular (Messina, 1999:440S). The rapid growth in the world population, the gradual improvement in the growth rates of national economies, and an acknowledged deficiency of protein in human diets of a majority of the world population have created a unique opportunity to enhance human consumption of soy bean protein in different parts of the world. Insufficient protein consumption remains a concern in developing nations, like Africa, where the cost or availability of traditional forms of animal protein results in protein deficiencies. The acceptance of an unfamiliar food depends on making it appear consistent with cultural perceptions and consumption patterns (Wansink & Cheong, 2002:277). A study done by Wansink and Cheong (2002:276), suggests that in the case of soy, targeting a taste-oriented segment of consumers who prefer soy can seed potential opinion-leaders who may eventually filter down the influence of these dietary habits on other consumers. A more productive

method to encourage people to consume soy may be to target the types of people who are more likely to prefer it for taste-related reasons (Wansink & Cheong, 2002:278). Although soy may seem like a new and different kind of food for many Americans, it is actually found in a number of products already consumed (Henkel, 2000:15). Soy can also be found in a number of South African products and is not new to the South Africa consumer. However, consumers' perception towards soy and soy products needs to be influenced positively in order to increase soy food sales in South Africa.

The author recommends the following guidelines to enable steady growth in the South African soy food market:

- ❖ Further examination (annually) and publication of the South African consumers' perception of soy and soy products similar to the United Soybean Boards' National Report.
- ❖ South African consumers (especially low income consumers) should receive education on the benefits of soy and soy products.
- ❖ Regularly updated information on new soy products available in South Africa should be available to consumers via different media sources, as well as in retail stores where these products are sold.

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## **ADDENDUMS**

**ADDENDUM A**

<b>SHOW CARD: Now let's look at the following statements concerning SOY (Soya) and the foods and drinks that are made from SOY (Soya). Could you please tell me whether you strongly agree, agree, neither agree nor disagree, disagree or strongly disagree with each statement?</b>							
	READ OUT. OMO 	STRONGLY AGREE	AGREE	NEITHER AGREE NOR DISAGREE	DISAGREE	STRONGLY DISAGREE	DON'T KNOW
1.	<b>I believe that SOY (Soya) is good for you</b>	-5	-4	-3	-2	-1	-6
2.	<b>I don't know where to buy SOY (Soya) products</b>	-5	-4	-3	-2	-1	-6
3.	<b>I don't like the taste of SOY (Soya)</b>	-5	-4	-3	-2	-1	-6
4.	<b>I would only use SOY (Soya) products if they would give me a specific health benefit for example - prevention of heart disease</b>	-5	-4	-3	-2	-1	-6
5.	<b>I eat/drink SOY (Soya) products</b>	-5	-4	-3	-2	-1	-6
6.	<b>I don't know how to prepare SOY (Soya) products</b>	-5	-4	-3	-2	-1	-6
7.	<b>SOY (Soya) is a good source of protein</b>	-5	-4	-3	-2	-1	-6
8.	<b>I would use/use more SOY (Soya) if it was readily available</b>	-5	-4	-3	-2	-1	-6
9.	<b>I never use SOY (Soya)</b>	-5	-4	-3	-2	-1	-6
10.	<b>I don't know where to use SOY (Soya) products</b>	-5	-4	-3	-2	-1	-6

**ADDENDUM A (continue)**

<b>SHOW CARD: Now let's look at the following statements concerning SOY (Soya) and the foods and drinks that are made from SOY (Soya). Could you please tell me whether you strongly agree, agree, neither agree nor disagree, disagree or strongly disagree with each statement?</b>							
	READ OUT. OMO	STRONGLY AGREE	AGREE	NEITHER AGREE NOR DISAGREE	DISAGREE	STRONGLY DISAGREE	DON'T KNOW
11.	<b>I would use/use more SOY (Soya) if there was a bigger product range</b>	-5	-4	-3	-2	-1	-6
12.	<b>I believe that SOY (Soya) is only for people with a low income</b>	-5	-4	-3	-2	-1	-6
13.	<b>SOY (Soya) is only for vegetarians</b>	-5	-4	-3	-2	-1	-6
14.	<b>I associate SOY (Soya) with meat substitutes</b>	-5	-4	-3	-2	-1	-6
15.	<b>I am aware of a number of meat substitutes made from SOY (Soya)</b>	-5	-4	-3	-2	-1	-6
16.	<b>The protein in SOY (Soya) is not as good as the protein in meat</b>	-5	-4	-3	-2	-1	-6
17.	<b>I associate SOY (Soya) with institutions like the army</b>	-5	-4	-3	-2	-1	-6
18.	<b>SOY (Soya) is only for baby formula</b>	-5	-4	-3	-2	-1	-6
19.	<b>I am aware that I can replace meat in my diet with SOY (Soya)</b>	-5	-4	-3	-2	-1	-6

## ADDENDUM B

Description and uses of different types of soya products in South Africa (Bianco, 1998:183).

<b>DESCRIPTION AND USES OF DIFFERENT TYPES OF SOYA PRODUCTS</b>		
<b>SOYA PRODUCT</b>	<b>DESCRIPTION</b>	<b>USES/SERVING</b>
FRESH SOYA BEANS	Sold in pods or shelled-fresh, frozen or canned. Soya beans are very tough and need to be boiled for a long time.	Often served as a vegetable with beef or seafood.
DRIED SOYA BEANS	Yellow, green-black or bi-coloured.	They need to be soaked and boiled and eaten in soups or salads.
SOYA BEAN SPROUTS	These are the seeds and their shoots, grown a couple of centi-metres long.	Usually eaten in spring rolls, as a sweet and sour vegetable or in salads. They may also be used as a garnish.
SOYA FLOUR	This is the flour produced by grinding soya beans.	Used in cakes and to bind ingredients in cooking.
SOYA BEAN OIL	An oil with a slight salty, soya taste. Amber or greenish colour.	Used for stir frying and in blended oils and margarines. Also used in commercial salad dressings.
BEAN PASTE (MISO)	Made from a paste of fermented soya beans mixed with rice, barley or wheat grains and salt.	It is used in the famous breakfast dish, 'misi'soup'. Also used to cook grilled foods and as a dressing for vegetables.
SOYA BEAN CURD (TOFU)	Made from dried soya which has been soaked and then crushed and boiled. The mixture is then separated into a pulp and a milk. The milk is treated to resemble a thick, creamy bean curd.	Used in a wide range of sweet and savoury dishes. Used extensively in Oriental cookery.
SOYA FLAKES	Similar to flakes produced from grains such as oats and wheat. They are made by toasting and rolling whole soya beans.	Can be used to make porridge or biscuits.
SOYA GRITS	Crushed and cooked soya beans.	They can be used instead of whole soya beans and take less time to cook.
SOYA BRAN	Made by removing and grinding the coarse outer layer of soya beans.	It can be used in the same way as wheat bran, sprinkle on breakfast cereal or added to savoury dishes to increase dietary fibre.
SOYA SAUCE (SHOYU)	A popular light or dark brown sauce used as a condiment in South East Asia and Japan. It is made from fermented soya beans and tastes sweetish and salty.	Used extensively in Oriental cookery.
SOYA CHUNKS/MINCE (TVP-Textured vegetable protein)	Sold in branded, flavoured form to consumers. To make the chunks, the soya bean is 'dehulled' through a process of heating and drying to remove the shell. The bean is then flaked under rollers. These flakes are put through an extraction process to remove oil. The remaining cake, which now contains less than 10% of oil, is milled to a flour. This flour is mixed with water and the mixture is pressed through an extruder to create the chunks.	Widely used as an alternative to dehydrated meat, as a mince, as a meat substitute in convenience meals and as a meat extender. It is also very popular in soups and may be used in pies and as a pizza topping.

## ADDENDUM C

### Soya mince products in South Africa (Bianco, 1998:184).

<b>SOYA MINCE</b>					
<b>BRAND NAME</b>	<b>PRODUCT</b>	<b>SIZE</b>	<b>ALLERGENS</b>	<b>ENERGY kJ per 100g/ml</b>	<b>TOTAL CARB. grams per 100gr/ml</b>
<i>Family favorite</i>	Chicken	100g,200g	S,Gm	*	*
	Chilli Beef	100g,200g	S,Gm	*	*
	Curry	100g,200g	S,Gm	*	*
	Mutton	100g,200g	S,Gm	*	*
	Savoury	100g,200g	S,Gm	*	*
	Tomato & Onion	100g,200g	S,Gm	*	*
<i>Imana</i>	Chicken	100g,200g	S,Gm	1300	*
	Chilli Beef	100g,200g400g	S,Gm	1300	*
	Curry	100g,200g	S,Gm	1300	*
	Lamb & Pepper	100g,200g	S,Gm	1300	*
	Mutton	100g,200g400g	S,Gm	1300	*
	Pepperoni	100g,200g400g	S,Gm	1300	*
	Rich Oxtail	100g,200g400g	S,Gm	1300	*
	Savoury	100g,200g400g	S,Gm	1300	*
	Tomato & Onion	100g,200g400g	S,Gm	1300	*
	Beef & Onion	100g,200g400g	E,S,Gm	1509	*
<i>Knorrox</i>	Chilli Beef	100g,200g400g	S,Gm	1265	*
	Chicken	100g,200g	S,Gm	1468	*
	Curry	100g,200g	S,Gm	1454	*
	Minestrone	100g,200g	S,Gm	1481	*
	Morogo Imfino & Onion	100g,200g	S,Gm	1438	*
	Mutton	100g,200g400g	S,Gm	1431	*
	Oxtail, Tomato & Onion	100g,200g400g	S,Gm	1440	*
	Savoury	100g,200g	S,Gm	1744	*
	Vegetable Stew	100g,200g	M,S,GI	1447	*
<i>Oxo</i>	Chilli Beef	100g,200g	M,E,S,GI,L	1320	44.90
	Curry	100g,200g	M,E,S,GI,L	1300	44.67
	Mutton	100g,200g	M,E,S,GI,L	1450	40.10
	Oxtail	100g,200g	M,E,S,GI,L	1430	40.10
	Savoury Beef	100g,200g	M,E,S,GI,L	1410	42.70
	Tomato & Onion	100g,200g	M,E,S,GI,L	1330	49.5
	Chilli Beef	100g,200g	M,E,S,GI,L	1417	47.5
<i>Royco vitamince</i>	Curry	100g,200g	M,E,S,GI,L	1417	49.9
	Mutton	100g,200g	M,E,S,GI,L	1458	51.8
	Oxtail	100g,200g	M,E,S,GI,L	1428	48.7
	Savoury	100g,200g	M,E,S,GI,L	1419	49.5
	Tomato & Onion	100g,200g	M,E,S,GI,L	1417	53.7

<i>Toppers</i>	Chilli	100g	E,S,GI,L	1450	47.35
	Curry	100g	E,S,GI	1370	49.53
	Savoury	100g	E,S,GI,L	1410	51.26
	Tomato	100g	E,S,GI,L	1370	46.25
	Tomato & Onion	100g	E,S,GI	1380	48.74
<i>Woza Woza</i>	Chicken	100g,200g	S,Gm	*	*
	Chilli Beef	100g,200g	S,Gm	*	*
	Curry	100g,200g	S,Gm	*	*
	Mutton	100g,200g	S,Gm	*	*
	Tomato & Onion	100g,200g	S,GI	*	*
<i>Soop</i>	Chicken Mince	100g,200g	S,GI,Gm	*	*
	Chilli Mutton	100g,200g	S,GI,Gm	*	*
	Curry Beef	100g,200g	S,GI,Gm	*	*
	Mutton Mince	100g,200g	S,GI,Gm	*	*
	Savoury Beef	100g,200g	S,GI,Gm	*	*

<b>Less obvious sources of food allergens and label ingredients that indicate the presence of food proteins</b>	
<b>M</b>	Milk and milk derivatives
<b>E</b>	Egg and egg derivatives
<b>S</b>	Soya bean and derivatives
<b>GI</b>	Wheat, rye, oats, barley and derivatives
<b>L</b>	Lactose
<b>Gm</b>	Glutamates

<b>Other icons</b>	
*	Where this icon appears, information (refer to column heading) was either not supplied or is unavailable