

Moving from Meat

Vegetarianism, Beliefs and Information Sources

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LIST OF PUBLICATIONS PUBLISHED OR SUBMITTED DURING CANDIDATURE

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Lea, E., & Worsley, A. (2002). The cognitive contexts of beliefs about the healthiness of meat. *Public Health Nutrition*, 5(1), 37-45.

Lea, E., & Worsley, A. Are information sources associated with Australians' beliefs about the necessity of meat? *Ecology of Food and Nutrition*; accepted for publication June 2001.

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ABSTRACT

A random population survey ($n=601$) and a survey of vegetarians ($n=106$) were conducted to examine South Australians' beliefs about meat and vegetarianism. Meat beliefs, barriers and benefits of vegetarianism, meat consumption, personal values, use of and trust in sources of food/nutrition/health information and demographic variables were measured via a written questionnaire.

There were differences in the responses of vegetarians, semi-vegetarians, and non-vegetarians. For example, vegetarians were more likely than non-vegetarians to use and trust unorthodox information sources and to hold universal values (e.g. "equality").

The factors associated with meat consumption and four sets of health-related beliefs about meat and vegetarianism (*Meat is Necessary*, *Vegetarianism Health Concerns and Appreciates Meat*, *Meat is Unhealthy*, *Health Benefits of Vegetarianism*) were examined. Other (health and non-health) beliefs, barriers and benefits of vegetarianism were the most important factors overall to be associated with these beliefs and with meat consumption. Information sources were also associated (particularly orthodox, unorthodox, mass media, advertising, and social sources). Together, these results provided insight into how consumption of meat and plant foods might be influenced.

Finally, the proportion of prospective vegetarians was gauged. Approximately 15% of non-vegetarians were found to hold similar beliefs about vegetarianism as vegetarians. Prospective vegetarians were distinct from vegetarians and the remaining

omnivores. For example, they were less likely than the remaining omnivores to eat red meat as frequently or to be Anglo-Australian.

The research suggested that a significant portion of the population is interested in vegetarian diets, but that certain barriers need to be overcome if this is to increase and lead to dietary change; in particular, the beliefs that vegetarian diets are nutritionally inadequate and that meat is essential for health. Tailored communications about how to prepare healthy, tasty vegetarian meals may also be useful. The results indicated the sources of food/nutrition/health information that may be most appropriate to disseminate such messages. Additionally, it was found that ethical (e.g. environmental, animal welfare) issues were linked to health and dietary behaviour. They may need to be more fully addressed by health professionals if the public is to obtain maximum benefit from plant-based diets, with minimum risk.

DECLARATION

This work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

I give consent to this copy of my thesis, when deposited in the University Library, being available for loan and photocopying.

EMMA J. LEA

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Chapter I

LITERATURE REVIEW

1.1 INTRODUCTION

Food is embedded with cultural meaning. The types of foods chosen for consumption and the ways in which they are prepared go beyond basic physiological needs (Douglas, 1972; Fischler, 1980; A. James, 1993; Kandel & Pelto, 1980; Messer, 1984). Indeed, “our bodies express meanings through food choices” (Adams, 1990, pg. 165). Different types of foods have different meanings attached to them for different people.

In modern Western societies, people are often faced with a bewildering choice of food-stuffs. The rise of agri-business and the import of foods from distant agricultural areas, including other countries, are contributors to this increased choice. A variety of food-stuffs are available throughout the year and are not restricted by seasonal availability. Added to this array of foods is the bombardment of individuals by the media, including advertising. According to Claude Fischler, modern individuals are experiencing a state of “gastro-anomy”, a lack of socio-cultural cues on which to base their dietary decisions (Fischler, 1980). Beardsworth and Keil (1997) speak of “menu pluralism”, where there are a variety of menus from which to choose, including traditional, convenience and moral menus. Vegetarianism is one particular menu that is available (Beardsworth & Keil, 1993), and it is the topic of this thesis. For some, a vegetarian diet may alleviate gastro-anomy by providing some sort of dietary guideline, and possibly a sense of belonging to a community of like-minded people (e.g. see Jabs, Sobal, & Devine, 2000).

Vegetarianism is a particularly rich set of dietary behaviours to examine as it incorporates a variety of meanings and issues, including health, ethics (such as the environment¹ and animal welfare), and spirituality. The rejection of meat is a symbolic food choice, not least because it is a high status food (Fieldhouse, 1986) and one that is a central element of a meal in modern Western society (Twigg, 1983). The act of eating or not eating meat is culturally, socially and symbolically imbued.

This thesis will examine beliefs about vegetarian diets and the factors that are associated with them, in the context of their implications for public health. This chapter will therefore examine the existing literature on:

- vegetarianism, including the motivations for, and prevalence of, this dietary behaviour;
- cognitive, social, socio-environmental, demographic and information factors as predictors of food choice behaviours; and
- the effects of vegetarianism and meat eating on health.

1.2 VEGETARIANISM

1.2.1 Origins and definitions of vegetarianism

The word “vegetarian” was coined in 1847 in England. The word is derived from the Latin word *vegetus*, meaning “whole, sound, fresh or lively” (Sussman, 1978). The nineteenth century was an important time for the growth of Western vegetarianism, when there was an emphasis on the association between spirituality, purity and

¹ The word *environment* has various meanings. The two relevant meanings for this thesis are: (1) "Natural World - the natural world, within which people, animals, and plants live"; (2) "Social and Physical Conditions - the conditions that surround people and affect the way they live" (Encarta World English Dictionary, 1999, pg. 627). To avoid any confusion about which meaning is implied when the word *environment* is used throughout this thesis, "socio-environment" is used to refer to the

vegetarianism (Whorton, 1994). Advocates included Sylvester Graham, John Harvey Kellogg, and Ellen White (co-founder of Seventh-Day Adventism). Animal rights movements were also popular at this time (Spencer, 1993). Non-meat-eating has a much longer history than this however, dating from at least the time of the philosopher Pythagoras, around 500 B.C. (Spencer, 1993).

Vegetarians exclude meat, fish, and fowl from their diet, basing their diet mainly on plant foods. Lacto-ovo-vegetarians eat dairy foods and eggs, while lacto-vegetarians eat dairy foods but omit eggs. Vegans avoid all animal products. There are also some people who wish to identify as "vegetarian" despite including some animal flesh (particularly fish and fowl) in their diet, perhaps due to the growing awareness of vegetarianism² (Adams, 1990; Fiddes, 1994). In addition, some people who consume comparatively small amounts of meat or fish refer to themselves as "semi-vegetarian" (or a similar term such as demi-vegetarian, pollo-vegetarian³, or pesco-vegetarian⁴) (Dwyer, 1991).

1.2.2 Reasons for vegetarianism

The conversion to vegetarianism can be either a gradual process or much more abrupt (Beardsworth & Keil, 1991; Jabs, Devine, & Sobal, 1998b). People may become aware of the "meat" on their plate as once being a live animal, or have a strong affective experience, such as seeing animals being slaughtered for food.

social/physical environment, thus reserving the word "environment" by itself to mean the natural/ecological environment.

² There is no formal index for this phenomenon, so it is not definitive; however, interviews with vegetarians, such as those conducted by Beardsworth and Keil (1993), have indicated its existence. Also, see the section below (pages 10-12) on the increase in the prevalence of vegetarianism and the decrease in red meat consumption.

³ Pollo-vegetarians consume poultry, but not red meat or fish.

⁴ Pesco-vegetarians consume fish, but not red or white meat.

Alternatively, they may learn about vegetarianism from significant others (i.e. friends or family members) or through reading books on health or animal rights (Jabs *et al.*, 1998b; Rozin, Markwith, & Stoess, 1997). Some may adopt a vegetarian diet after experiencing certain life transitions, such as divorce, beginning college, or moving home (Jabs *et al.*, 1998b) .

Vegetarians cite a variety of reasons for their choice of diet. These include health, taste, animal welfare, economic, spiritual, religious, food production, and environmental reasons. There are a number of studies that have investigated these (e.g. Amato & Partridge, 1989; Beardsworth & Keil, 1991, 1992; Hess, Flick, & Oltersdorf, 1993; Jabs *et al.*, 1998b; Kenyon & Barker, 1998; Kim, Schroeder, Houser, & Dwyer, 1999; V. Lawrence, 1993; Neale, Tilston, Gregson, & Stagg, 1993; Rozin *et al.*, 1997; Santos & Booth , 1996; Stiles, 1998).

The reasons for becoming vegetarian may be different to those reasons for maintaining vegetarianism, with the latter possibly also changing and developing over time as more information is obtained (Rozin, 1997; Stiles, 1998). This seems to be particularly so for vegetarians with ethical (animal welfare or environmental) motivations for their initial dietary choice as opposed to vegetarians who are motivated primarily by health reasons, as the former usually incorporate health and other reasons for their consumption of a vegetarian diet eventually (Rozin, 1997). Individual vegetarians often incorporate multiple reasons for their dietary choice (Beardsworth & Keil, 1991).

Ethical or moral reasons for vegetarianism include the reaction against “speciesism”, which is discrimination against non-human animals (Singer, 1990). Singer and others argue that non-human animals are sentient beings that can experience suffering and enjoyment and therefore should not be exploited by humans. Rozin *et al.* (1997) have identified a process that they call *moralisation*, whereby preferences are converted into values, and they posit that some vegetarians have moralised the consumption of meat. Vegetarians with moral reasons against meat consumption agreed with such statements as “it increases pain and suffering in animals” (59% of a sample of 119 meat-avoiders agreed), “it violates the animal’s rights” (56% agreed), or “we demean ourselves by raising animals for food, and killing them” (49% agreed) (Rozin *et al.*, 1997). Animal welfare factors are an important reason for why many vegetarians choose to stop eating meat. For example, 81% of respondents in a survey of young (15-30 years) female vegetarians selected animal welfare as an important element in their decision to become vegetarian (Neale *et al.*, 1993) .

Some non-vegetarians also believe that the consumption of a vegetarian diet has animal welfare benefits. A random population survey of 420 United States residents found that 43% of non-vegetarians somewhat or strongly agreed that vegetarian diets help prevent cruelty to farm animals (Dietz, Guagnano, & Stern, 1994; Kalof, Dietz, Stern, & Guagnano, 1999). It can be argued that many non-vegetarians feel repugnance towards the slaughter of animals for food, symbolised by both the move of the slaughter industry from visible, urban areas to hidden, rural areas, and the trend away from carving whole animals at table to serving unidentifiable parts of animals (Mennell, 1985). Many do not want to know the details of how their food got to their plate (Mennell, 1985; Webster, 1994). Indeed, a British survey of the general

population found that the majority of respondents would stop eating meat altogether if they had to kill animals themselves in order to eat them (N. J. Richardson, Shepherd, & Elliman, 1993).

Another important reason for the consumption of a vegetarian diet is the belief that meat is unhealthy and that a vegetarian diet is a healthier alternative. For example, some vegetarians agree that “a diet containing 'meat' is not as healthy as a vegetarian diet”, or “even a diet that contains small amounts of 'meat' is unhealthy” (Rozin *et al.*, 1997). In Rozin's study (1997), 78% of respondents agreed with the former statement (and this was the initial reason why 30% of respondents began to avoid meat), while 38% agreed with the latter. Vegetarians may associate meat with food poisoning and diseases such as heart disease (Beardsworth & Keil, 1991). Recent research has indicated that some non-vegetarians may also consider meat to be fattening or generally unhealthy (Holm & Møhl, 2000; Povey, Wellens, & Conner, 2001). Indeed, a United States survey found that 56% of non-vegetarian respondents at least partially agreed that a vegetarian diet tends to be healthier than a diet that includes red meat (Dietz *et al.*, 1994; Kalof *et al.*, 1999). The health aspects of the consumption of a vegetarian diet will be discussed below (section 1.4, pages 42-47).

With the proliferation of readily accessible information over the last few decades has come more awareness of food-safety and risks associated with the consumption of food, which may contribute to gastro-anomy (Beardsworth & Keil, 1997). Vegetarianism may result in a greater sense of control over not only one's diet, but also one's life. This sense of control may in itself be a reason for becoming vegetarian or for maintaining a vegetarian diet. For those who avoid meat, anxiety

over chemical additives, steroids and hormones in meat and over such scares as the Bovine Spongiform Encephalopathy endemic ("mad cow disease") may be diminished (Beardsworth & Keil, 1991; Lacey, 1992), as may anxiety over the ethical issues involved in meat production and consumption.

Some people simply do not enjoy the taste and texture of meat, although it is probable that the idea of meat as a symbol of death and decay is implicated to some extent in this lack of enjoyment. Meat may be viewed as an object of disgust by vegetarians (Beardsworth & Keil, 1992; Rozin, Haidt, & McCauley, 1993; Rozin *et al.*, 1997) and also by some non-vegetarians (Holm & Møhl, 2000). Meat is often considered a "non-food" by vegetarians (N. J. Richardson, 1994).

The taste of plant foods may also be a factor in eating less or no meat. Indeed, one study of young (15-30 years) female vegetarians found that the enjoyment of eating vegetarian food was a more important reason for becoming vegetarian than was dislike of meat (37% of respondents agreed that the former was an important reason, while 22% agreed that the latter was important) (Neale *et al.*, 1993). Few other studies have examined these more positive gustatory aspects of vegetarian diets. One exception is the qualitative study that was conducted by Beardsworth and Keil (1992) among seventy-six vegetarians and vegans from the United Kingdom. Some vegetarians noted that increased dietary variety was a benefit of consuming a vegetarian diet. This was because they viewed meat-containing diets as based on conventional patterns of food choice and as therefore less innovative than vegetarian diets. In addition, plant foods were viewed as being tastier and having a better texture than meat, and being "lighter", although still satisfying (Beardsworth & Keil, 1992).

Similarly, a study of the general United States population found that almost everyone liked the taste of fruit and vegetables, and many felt "lighter" and more energetic after eating these foods (Balch, Loughrey, Weinberg, Lurie, & Eisner, 1997).

Some vegetarians (and others) argue that the production of meat is a waste of resources because the grain produced to feed livestock could be used directly to feed humans (Fieldhouse, 1986; World Cancer Research Fund & American Institute for Cancer Research, 1997). For example, in addition to copious forage, four kilograms of dry plant protein suitable for consumption by humans is required to produce one kilogram of animal protein (Pimentel & Pimentel, 1979).⁵ In addition, it is claimed that people in the Third World suffer from hunger even when they produce foods such as grains because, instead of being able to consume the foods themselves (or use the land to grow other foods for themselves), they are used as a cash crop to feed livestock in Western countries (Lang, 1999a; S. Lewis, 1994). The United States random population survey by Kalof and others (Dietz *et al.*, 1994; Kalof *et al.*, 1999) found that 45% of respondents (42% of non-vegetarians and 85% of vegetarians) at least partially agreed that the consumption of a vegetarian diet helps to increase food availability and to reduce hunger problems world-wide.

Environmental reasons are often cited as justification for adopting a vegetarian diet or consuming less meat. These include destruction of forested areas to make room for grazing animals or for their food-crops, soil erosion, excessive water usage, water

⁵ Note that this figure is an average for livestock, and that the ratio varies according to the particular animal and the type of feed (e.g. milk is the most efficiently produced animal protein, with 1 kg of milk protein produced from about 3.2 kg of plant protein, half of which is from grains suitable for human consumption, while 1 kg of grain/grass-fed beef is produced from 15.8 kg of plant protein) (Pimentel & Pimentel, 1979).

pollution and methane production (Fieldhouse, 1986; Leckie, 1999; S. Lewis, 1994; Pimentel, Houser, Preiss, & White, 1997; Spedding, 1990). For example, the production of one kilogram of animal protein requires about one hundred times more water than does the production of one kilogram of vegetable protein (Pimentel & Pimentel, 1996). These problems result from modern intensive livestock farming methods and from the vast (and increasing) numbers of domestic animals in the modern world (Gussow, 1994). The United States random population survey by Kalof and others (Dietz *et al.*, 1994; Kalof *et al.*, 1999) found that 45% of respondents (42% and 86% of non-vegetarians and vegetarians, respectively) somewhat or strongly agreed that vegetarian diets are less harmful to the environment than are diets that contain meat.

Eating meat is thought by some to taint the body spiritually. For example, meat may be seen as embodying animal passions. Some vegetarians believe that the appetite for carnality and for aggressiveness is increased if meat is consumed (Twigg, 1979).

Some religions advocate vegetarianism, at least partially, including Seventh-Day Adventism, Buddhism⁶ and Hinduism (Fieldhouse, 1986). However, in modern Western societies, religious reasons are of relatively little importance compared to other motivations, particularly animal welfare, health and environmental issues (Beardsworth & Keil, 1991; Freeland-Graves, Greninger, & Young, 1986; Neale *et al.*, 1993; Ouédraogo, 1999).

⁶ Meat is eaten in many Buddhist areas however, although Buddhists vow to abstain from killing or injuring animals. Monks and devout laypeople observe non-meat-eating most strictly (Fieldhouse, 1986, pg. 131).

Thus, various reasons are provided for consuming little or no meat. This thesis will examine the presence of such beliefs about meat and vegetarianism (including perceptions of the benefits of vegetarian diets) among both vegetarians and non-vegetarians, and how they are related to other beliefs, dietary behaviour, sources of food, health and nutrition information, personal values, and demography. The perceived benefits of vegetarianism have not been examined extensively among non-vegetarians. However, previous research (discussed above) does suggest that some non-vegetarians may hold similar beliefs to vegetarians. For example, some non-vegetarians perceive there to be health, environmental, or animal welfare benefits associated with the consumption of a vegetarian diet (Holm & Møhl, 2000; Kalof *et al.*, 1999; Povey *et al.*, 2001; N. J. Richardson *et al.*, 1993).⁷ One way the knowledge about the benefits of vegetarianism, as perceived by non-vegetarians and vegetarians, will be utilised in this thesis is to estimate the proportion of non-vegetarians who hold similar beliefs to vegetarians. Apart from their relevance to vegetarian diets, benefits of vegetarian diets may also be important to examine as they may relate to broader plant-based diets that contain some meat.

1.2.3 Prevalence of vegetarianism

A number of studies have considered the prevalence of vegetarianism (e.g. American Dietetic Association, 1997b; Australian Bureau of Statistics, 1997; Gallup, 1997; Kalof *et al.*, 1999; N. J. Richardson, Shepherd, & Elliman, 1994; Vegetarian Resource

⁷ Note that Kalof and Dietz's study (Dietz *et al.*, 1994; Kalof *et al.*, 1999), which examined four benefits of vegetarianism among the general population and therefore, to the candidate's knowledge, is the most extensive study of such beliefs among non-vegetarians apart from the present study, was published after the collection of data for the present study was complete. The four benefits in full were "I believe a vegetarian diet is generally more healthy than a diet that includes red meat", "I believe a vegetarian diet is less harmful for the environment than a diet that includes meat", "I believe a vegetarian diet helps prevent cruelty to farm animals" and "I believe a vegetarian diet helps make more food available and helps reduce problems of hunger in this country and around the world".

Group, 2000; Vegetarian Society UK, n.d.; White & Frank, 1994). They suggest that the number of people who report that they are vegetarian is increasing in Western countries. A recent National Zogby poll in the United States found that 2.5% of people stated that they never eat meat, poultry or fish/seafood (Vegetarian Resource Group, 2000), whereas this figure was 1% in a 1997 American Roper Poll (American Dietetic Association, 1997b). In Britain, a survey carried out by Gallup in 1984 gave a figure of 2.1% for respondents reporting themselves as vegetarian; in 1995 this number had increased to 4.5%; and in 1999 to 5.0% (Gallup, 1997; Vegetarian Society UK, n.d.). The self-reported prevalence of vegetarianism in Australian adults aged 19 and over was 3.7% in 1995, as reported in the 1995 National Nutrition Survey (Australian Bureau of Statistics, 1997). In South Australia⁸, this figure was 3.3% (Australian Bureau of Statistics, 1995). This thesis will provide an estimate of the current prevalence of vegetarianism in South Australia.

It should be noted that it is likely that when vegetarianism is self-reported, rather than measured more objectively (such as in the American Roper Poll, above), an over-estimate of the prevalence of vegetarianism is obtained. There has been an increase in the numbers of people who identify themselves as "vegetarian" despite including some animal flesh (particularly fish and fowl) in their diet (Adams, 1990; Fiddes, 1994). Thus there are usually some respondents who will answer in the affirmative to the question "Are you a vegetarian?" yet eat some fish or meat (e.g. Dietz, Frisch, Kalof, Stern, & Guagnano, 1995). However, they usually avoid red meat.

⁸ South Australia is a state of Australia with a population of 1, 427, 936 (Australian Bureau of Statistics, 1996).

In addition to the increase in vegetarianism and identification as a vegetarian, it appears that many more people are choosing to eat some meatless main meals or to reduce their consumption of particular types of meat. For example, in a 1999 random poll of the general American population, 57% of the population sometimes, often or always ordered a vegetarian dish when eating out (Vegetarian Resource Group, 1999). Similarly, a 1999 survey conducted in the United Kingdom found that 41% of respondents ate a meat-free meal on a regular basis and 16% of respondents ate meat-free meals most or all of the time (Vegetarian Society UK, n.d.). There has been a decrease in the consumption of red meat in recent years (Baghurst, 1999; Rosegrant, Leach, & Gerpacio, 1999). In Australia, red meat consumption has been decreasing since the 1970s (Baghurst, 1999).⁹

1.2.4 Variation in the prevalence of vegetarianism between age and sex groups

The prevalence of vegetarianism is higher amongst young people. For example, about 8% of people aged between 11 and 18 are vegetarian in the United Kingdom (Vegetarian Society UK, 1991), compared to just over 5% of adults (above). An Australian study of adolescents self-reporting themselves as currently vegetarian gave a figure of 8% for females, compared to 3.7% of adults (above), although only 3% of young males were vegetarian (Worsley & Skrzypiec, 1997). The 1995 National Nutrition Survey reported that vegetarianism had the highest prevalence among those aged 19 to 24 years (Australian Bureau of Statistics, 1997).

⁹ Mean red meat intake in Australia in 1995/1996 was 88g a day for men and 45g a day for women, according to the National Dietary Survey. This represented a decrease in red meat consumption of 20% since the 1983 Australian National Dietary Survey (Baghurst, 1999).

More females than males are vegetarian (e.g. Kalof *et al.*, 1999). To give a specific example, 4.9% of Australian women and 2.6% of Australian men are self-reported vegetarians (Australian Bureau of Statistics, 1997) (4.2% and 2.4% of South Australian men and women, respectively (Australian Bureau of Statistics, 1995)). One reason for this could be the greater emphasis on the appearance of women (Charles & Kerr, 1986). A concern with appearance has been found to be one reason why people practice healthy behaviours, such as following healthy diets (Hayes & Ross, 1987). In Australia, three times as many women than men report that they are currently on a (non-vegetarian) weight reduction diet (2.5% of men 19 and over compared to 7.6% of women in the same age group) (Australian Bureau of Statistics, 1997). Vegetarians generally have a lower body-mass index than non-vegetarians (Key, Davey, & Appleby, 1999; Li *et al.*, 1999; Thomas, Davey, & Key, 1999), and so adopting a vegetarian diet could be seen as one way of controlling weight. In addition, women are generally more health-conscious than men and value health more highly (Kristiansen, 1990; Worsley, 1988a). Women tend to have more knowledge about the healthiness of different foods, prefer healthier foods such as fruits and vegetables, and are more likely to rate them as more pleasurable than men do (Axelson, 1986; Rappoport, Peters, Downey, McCann, & Huff-Corzine, 1993; Worsley, 1988b).

Another possible reason for the higher prevalence of vegetarianism among women is the link between men and meat, and feminism and vegetarianism (Adams, 1990). Meat is seen as men's food in many cultures, while non-meat foods such as fruit and vegetables are viewed as women's food (Adams, 1990; Twigg, 1983). Historically, vegetarianism has been associated with feminism and radical politics (Adams, 1990;

Leneman, 1997). Women and food-animals both suffer from objectification. The eating of meat and male dominance over women may both be viewed as acts of power (Adams, 1990). Being vegetarian may be seen as challenging male dominance (Adams, 1990).

1.2.5 Values and vegetarianism

There are a variety of factors that may underpin vegetarianism (e.g. Sims, 1978). Under the surface structure of a different diet there may lie deeper structures such as a turning away from society, a move towards a different value or belief system, lack of faith in authority, environmentalism, and a strong belief in equality, incorporating feminism and animal “rights”. Vegetarians generally hold different values to non-vegetarians. An American study conducted by Dietz *et al.* (1995) found that vegetarians were more likely to hold altruistic ("universal") values (such as "unity with nature", "protecting the environment", "preventing pollution", "a world at peace" and "equality") and were less likely to hold traditional values (such as "honouring parents and elders", "honest", "family security" and "self-discipline") than non-vegetarians. A recent New Zealand study found that, compared with the vegetarians in the study, the omnivores were more likely to support hierarchical domination rather than peace, equality and social justice (Allen, Wilson, Ng, & Dunne, 2000). Similarly, a study of Australian teenagers found that vegetarians tended to be more in favour of gender equity, or feminism, and animal welfare than were non-vegetarians (Worsley, Baghurst, & Skrzypiec, 1995; Worsley & Skrzypiec, 1997). Vegetarians are inclined to be more concerned with ecology and to be more holistically orientated than non-vegetarians. It has been suggested that many vegetarians wish to “live a 'blameless' existence” (Hamilton, Waddington, Gregory, & Walker, 1995, pg. 508).

This thesis will describe any differences in the strength of the personal values held by vegetarians, semi-vegetarians and non-vegetarians. It will also examine any associations between personal values and beliefs about meat and vegetarianism, including barriers and benefits of vegetarianism, use of and trust in sources of food, health and nutrition information, and level of meat consumption. It is hypothesised that vegetarians will hold more universal values than non-vegetarians, while non-vegetarians will hold more power and tradition-oriented values. Meat consumption and positive beliefs about meat are therefore likely to be positively associated with power and tradition-oriented values, while negative beliefs about meat are likely to be associated with universal values.

The underlying sense of dismay about the state of society and the world in general that some vegetarians may feel may be expressed in their diet. However, just as during times of political conservatism, environmentalism may be tolerated as an outlet for anti-establishment attitudes (Forgas & Jolliffe, 1994)¹⁰, it is possible that dietary differences (such as vegetarian or organic) are more socially accepted than broad anti-establishment attitudes.¹¹ In other words, having a relatively unusual diet may not be seen to be especially threatening by society, even if it is an expression of dismay about the state of society. Society, however, may be moving towards a new system of more universal social beliefs and values. According to Herrera (1992), this is the case

¹⁰ A United States study found a high level of environmental concern, but this was not accompanied by much depth, or environmental *consciousness* (Krause, 1993). People were not allowing environmentalism to disrupt their lifestyle and so did not make any major sacrifices to the cause. This is one reason why environmentalism is not seen to be particularly threatening, at least in the United States; in a sense, it has become incorporated into “mainstream” society.

¹¹ Yet, through their diet, vegetarians may be acting out environmentalism; perhaps such people hold stronger or differing environmental values to the general public.

with regard to environmentalism, and it is possible that it is so for vegetarianism also (as meat becomes "moralised") (Rozin *et al*, 1997) .

1.2.6 Vegetarianism and health practices and beliefs

Vegetarians and non-vegetarians differ in their attitudes and beliefs towards health practices (e.g. Sims, 1978). Vegetarians are more likely than non-vegetarians to be receptive towards alternative/complementary therapies and/or preventive treatments, and to use less alcohol, tobacco, or prescription drugs (Beilin, 1993; Dwyer, Mayer, Kandel, & Mayer, 1973; Freeland-Graves, Greninger, Graves, & Young, 1986; Furnham & Forey, 1994; Hamilton, 1993; Key, Fraser *et al.*, 1999; Knutsen, 1994; Walter, 1997). This thesis will examine differences between vegetarians and non-vegetarians in their use of and trust in alternative health practitioners and other unorthodox sources, as well as orthodox sources such as doctors.

1.3 FACTORS ASSOCIATED WITH FOOD CHOICE BEHAVIOURS

Cultural, social, psychological and sensory acceptance factors are the overarching factors that strongly influence the food choice of an individual. These include values, attitudes, beliefs, personality traits, significant others, the socio-environment, information and demography (Barker, Thompson, & McLean, 1995; Conner & Norman, 1996; Cosper & Wakefield, 1975; Falconer, Baghurst, & Rump, 1993; McIntosh & Guseman, 1985; N. J. Richardson *et al.*, 1993; Sapp & Harrod, 1989; Shepherd & Sparks, 1994; Shepherd & Stockley, 1987; Sims, 1978; Zey & McIntosh, 1992). Some of these factors, such as beliefs and information, are open to change and are therefore an important means through which to influence health behaviour (Conner & Norman, 1996).

1.3.1 Attitudes, beliefs and values as predictors of behaviour

Attitudes, beliefs and values

The definition of “attitude” differs between researchers. According to Olson and Zanna (1993), however, “most attitude theorists agree that (a) evaluation constitutes a central, perhaps predominant, aspect of attitudes, (b) attitudes are represented in memory, and (c) affective, cognitive, and behavioral antecedents of attitudes can be distinguished, as can affective, cognitive, and behavioral consequences of attitudes” (Olson & Zanna, 1993, pg. 119).

Beliefs are the “cognitive (thinking) component of attitudes” (Assael, 1992, pg. 42). Several beliefs focused on a particular object or situation constitute an attitude towards that object or situation (Rokeach, 1973). Beliefs influence attitudes, which in turn may alter behaviour (Ajzen, 1989; Fishbein & Ajzen, 1975; Sapp, 1991). A selection of both positive and negative beliefs about meat and vegetarian diets will be examined in this thesis, to assess their association with behaviour and other beliefs and factors.

Values influence attitude formation, cognition and behaviour, the latter mainly through the mediation of beliefs and attitudes (Feather, 1982; Kalof *et al.*, 1999; Pollay & Gallagher, 1990). Values may be defined as lasting beliefs about desirable goals that function as guiding principles in life (Rokeach, 1973; Schwartz, 1992). Values are abstract and able to be generalised, unlike attitudes, and they can be ordered hierarchically by importance (Schwartz, 1992).

Schwartz (1992) distinguishes ten types of personal values: (1) *universalism* (such as "protecting the environment", "equality", "unity with nature", "broadminded", "inner harmony", "social justice"); (2) *benevolence* (e.g. "spiritual life", "helpful"); (3) *tradition* (such as "respect for tradition", "moderate", "devout"); (4) *conformity* (such as "self discipline", "politeness", "obedient", "honour parents"); (5) *security* (e.g. "social order", "family security", "healthy"); (6) *power* (such as "authority", "social recognition", "wealth"); (7) *achievement* (e.g. "successful", "influential", "intelligent"); (8) *hedonism* (e.g. "pleasure", "enjoying life"); (9) *stimulation* (e.g. "varied life", "exciting life"); (10) *self-direction* (such as "freedom", "independent", "curious"). Values such as these have been found to be associated with food choice behaviours, including vegetarianism (e.g. Dietz *et al.*, 1995; Grunert, Brunso, & Bisp, 1993; ter Hofstede, Steenkamp, & Wedel, 1999). This thesis will examine a selection of Schwartz's personal values and describe any differences between vegetarian and non-vegetarian groups, as has been discussed above.

The impact of demographic factors on beliefs and attitudes

Demographic factors, such as age, sex, and socioeconomic differences, act upon attitudes and beliefs towards various foods (Barker *et al.*, 1995; Conner, 1994; Kalof *et al.*, 1999; Lennernas *et al.*, 1997; Margetts, Martinez, Saba, Holm, & Kearney, 1997; Rappoport *et al.*, 1993). For example, it has been noted that males and females have different food preferences (Rappoport *et al.*, 1993). In Rappoport and others (1993) study, females rated healthy meals higher in health, convenience and pleasure. Their sample could also be differentiated by age, with those twenty and under giving different pleasure and health ratings to particular foods than those twenty-one and over. In Kalof *et al.* study (1999), women and black Americans were more likely than

men and white Americans to believe that the consumption of a vegetarian diet has health, animal welfare and environmental benefits.

It is hypothesised that demographic items will be associated with level of meat consumption and beliefs about meat and vegetarianism, including benefits of and barriers to vegetarianism.

1.3.2 Social norms and stereotypes

Social norms and stereotypes can influence how receptive an individual is to particular foods and to dietary change (e.g. Barker, Tandy, & Stookey, 1999; Contento & Murphy, 1990). Worsley and Worsley (1991) suggest that it is important to consider the influence of subjective prescriptive norms in food choice. In their study, women rated “healthy” foods as more desirable than less healthy foods.

Diet-based social stereotypes exist (Fries & Croyle, 1993). Stereotypes have been defined as both “shared, consensual beliefs about a group and as individual perceivers’ beliefs about a group” (Olson & Zanna, 1993, pg. 141). Low-fat diets have been found to be associated with mainly positive personal attributes such as "healthy", "slim", "intelligent", and "middle-class", while high-fat diets are associated with mainly negative attributes such as "unhealthy", "overweight", "unintelligent" and "smoking" (Barker *et al.*, 1999). An American study by Sadalla and Burroughs (1981) found that vegetarians are viewed as being pacifist, hypochondriacal, drug-using, weight-conscious, and liberal. Vegetarianism may be perceived as a non-traditional or even radical life-style choice and thus shunned by those who have more traditional values (Dietz *et al.*, 1995). Stereotypes (social knowledge about food)

need to be taken into account when trying to influence food choice, as well as more health-related knowledge about food (Barker *et al.*, 1999). If there are negative stereotypes associated with a particular diet, this can create a barrier to change. Red meat, for example, symbolises success, power, status, and achievement for some people, and hence may be why an excess of animal fat is consumed despite nutritional information advising lower consumption (Sadalla & Burroughs, 1981). The fact that there are some non-vegetarians who adopt the label “vegetarian” indicates that vegetarianism has a positive image for a greater number of people than the number of actual vegetarians.

This thesis will examine social norms through measuring the number of vegetarian friends and family members survey respondents have, as well as if having meat-eating friends and family or feeling conspicuous among others present barriers to eating a vegetarian diet. The survey also measures whether respondents believe that meat is a food more likely to be eaten by men rather than women, and if red meat is eaten out at restaurants on social occasions. In addition, it measures some stereotypes linked with vegetarianism (that vegetarians are "hippies" or "weirdos", "wimps" or not "macho" enough).

1.3.4 Models of behavioural change

Models for behavioural change have been applied to food behaviour with the aim of leading to a greater understanding of food choice and the factors influencing it. A variety of models have been constructed to predict health behaviour. These include the health belief model (Rosenstock, 1974), the Ajzen-Fishbein theory of reasoned action (Fishbein & Ajzen, 1975), the theory of planned behaviour (Ajzen, 1985), and

the stage of change (transtheoretical) model (Prochaska, DiClemente, & Norcross, 1992; Prochaska *et al.*, 1994). These and similar models have been applied to various food choices, such as beef (Sapp, 1991; Sapp & Harrod, 1989; Zey & McIntosh, 1992), meat in general (N. J. Richardson *et al.*, 1993), fruit and vegetables (Brug, Glanz, & Kok, 1997; Laforge, Greene, & Prochaska, 1994; McIntosh & Guseman, 1985), low salt bread (Tuorila-Ollikainen, Lahteenmaki, & Salovaara, 1986), milk (C. J. Lewis, Sims, & Shannon, 1989; Tuorila-Ollikainen, 1987), and reductions in dietary fat (McIntosh, Kubena, Jiang, Usery, & Karnei, 1996; Ôunpuu, Woolcott, & Greene, 2000). Food choice models can influence health by being applied to the implementation of policies and interventions to alter people's food choices (Furst, Connors, Bisogni, Sobal, & Falk, 1996).

One of the most general food choice models is that of Furst *et al.* (1996), who developed a conceptual model of the process involved in food choices. They group the factors involved in food choice into three groups: 1) life course, 2) influences, 3) personal system. *Life course* includes personal roles and the social, cultural and physical environments to which a person has been and is currently exposed to. *Influences* are ideals, personal factors, resources, social framework, and food context, while one's *personal system* includes the value negotiations involved with sensory perceptions, quality, managing relationships, monetary considerations, convenience, and health and nutrition, as well as unconsciously operationalised strategies. Some additional values to those already mentioned did emerge, such as ethics, but they were relatively less important. The model is a complex one, reflecting the complexity and diversity involved in food choice (Furst *et al.*, 1996) .

The health belief model focuses on the role in health behaviour of perceptions of the threat of illness and the evaluation of behaviour to deal with this threat (Conner & Norman, 1996). Along with perceived susceptibility to the condition, the perceived seriousness of the condition, and self-efficacy (the belief that one can or cannot carry out the action), the perceived benefits and barriers to taking action are important predictors of preventive health behaviour in the health belief model (McDonell, Roberts, & Lee, 1998; Rosenstock, 1974, 1990).

Perceived benefits and barriers to change have been examined in many studies of dietary change (e.g. Balch *et al.*, 1997; Cox, Anderson, Lean, & Mela, 1998; Lappalainen, Saba, Holm, Mykkanen, & Gibney, 1997; Lloyd, Paisley, & Mela, 1995; McDonell *et al.*, 1998; Sparks, Guthrie, & Shepherd, 1997; Zunft *et al.*, 1997). Perceived benefits of dietary changes and of healthy eating may include being healthy, disease prevention, weight control and improved quality of life (Zunft *et al.*, 1997). The benefits more specifically associated with vegetarian diets have been discussed above (pages 3-10). It has been argued that it is only when the benefits of change outweigh the barriers that a change in behaviour occurs (McIntosh *et al.*, 1996; Nestle *et al.*, 1998; Rosenstock, 1974; Wolinsky, 1980). People often face barriers when they try to change their food consumption (Cox *et al.*, 1998; Lappalainen *et al.*, 1997; Lloyd *et al.*, 1995). These barriers may be practical or attitudinal. For example, one attitudinal barrier to dietary change is the belief commonly held by consumers that their diet is already balanced or healthy (Beard, Wyllie, & Caswell, 1989; Cox *et al.*, 1998; Kearney *et al.*, 1997), while irregular working hours is an important practical barrier (Lappalainen *et al.*, 1997). The main perceived barriers to eating a healthy diet in a European Union survey were lack of

time (a barrier for 33% of the population) and self-control (33%), followed by resistance to change (21%) and food preparation (19%), among other less important barriers (Lappalainen *et al.*, 1997). Time has also been found to be a major barrier to the more specific health behaviour of consuming more fruit and vegetables, with inconvenience also very important (Balch *et al.*, 1997).¹²

Therefore, as well as examining the perceived benefits of eating a vegetarian diet, the perceived barriers that non-vegetarians, semi-vegetarians and vegetarians have to eating a vegetarian diet will be examined in this thesis. It was posited that some barriers were likely to be the same as barriers to other dietary behaviours, such as those mentioned above (e.g. a perception of inconvenience), while others would be more specific to vegetarianism. For example, since meat is traditionally a central element of a meal in Western society (Twigg, 1983), not knowing what to replace meat with may be one of the barriers to becoming vegetarian or maintaining the vegetarian diet. An examination of the perceived barriers and benefits of consuming a vegetarian diet will allow the implementation of strategies to influence meat and vegetarianism beliefs and dietary behaviour.

The theory of reasoned action, proposed by Fishbein and Ajzen (1975), determines behavioural intentions by combining attitudes and subjective norms or perceived

¹² It should be noted that the barriers and benefits of a behavioural change that an individual *actually* faces might differ to those that they *perceive* that they face. For example, an individual may believe that they will be negatively stereotyped if they alter their behaviour, but this may not necessarily occur upon making the behavioural change (although, of course, a belief that one will be negatively stereotyped may be an effective barrier whether or not such stereotyping actually occurs). Similarly, an individual may believe that one benefit of a behavioural change is increased longevity (for example), but this may not actually be the case. Indeed, there may be strong benefits of making a behavioural change that have been identified by the scientific community which are not realised by an individual, who instead may perceive other (perhaps less valid, according to the scientific community) benefits to

group pressure (Olson & Zanna, 1993). Support for the application of the theory of reasoned action to food behaviour was provided by the study of Zey *et al.* (1992), where the theory was used to predict intention to eat beef. Norms were found to be predictors of intention to eat beef, and, although attitudes were not, the most salient beliefs underlying these attitudes were found to be predictors (Zey & McIntosh, 1992). Information seeking can play a role in forming or modifying health behaviours in this model, such as in the selection of role models (Rakowski *et al.*, 1990) .

The theory of planned behaviour was proposed by Ajzen, and builds upon the theory of reasoned action (Ajzen, 1985). In addition to attitudes and subjective norms, perceived behavioural control (a concept similar to self-efficacy) is seen to determine behavioural intentions (Olson & Zanna, 1993). The theory of planned behaviour has recently been applied to intentions to consume vegetarian, vegan, meat reduced and meat diets; attitudes, subjective norm and perceived behavioural control were all found to be significant predictors of the intention to follow each diet (except that subjective norm was not a significant predictor of the intention to follow a vegetarian diet) (Povey *et al.*, 2001) .

The above models - the health belief model, the theory of reasoned action and the theory of planned behaviour - are useful because they provide the psychosocial variables that need to be considered in the design of nutrition communications for the mass media or other settings to increase motivation for dietary change (I. Contento *et al.*, 1995). However, the following model - the stage of change model - is one model that can help in the design and implementation of effective strategies to modify these

be more important. However, it is the benefits perceived by an individual that are important in

psychosocial variables and to improve the likelihood of dietary change. This is because its focus is on the *process* of change.

The stage of change model posits behavioural change occurring through five separate stages: (1) precontemplation; (2) contemplation; (3) preparation; (4) action; (5) maintenance (Prochaska *et al.*, 1992; Prochaska *et al.*, 1994). Precontemplation is the stage when the individual has not considered changing their behaviour. Contemplation is the stage when the individual is thinking about changing their behaviour. The preparation stage is reached when the individual intends to change their behaviour in the next month. At the action stage, the behaviour change has been made in the last six months. Maintenance is the stage when the behaviour change has been adopted for six months or more (Prochaska *et al.*, 1992; Prochaska *et al.*, 1994). Elements of the other models mentioned above may be incorporated into stage models, depending on which cognition is important at a particular stage (Norman & Conner, 1996). For example, the perceived benefits and barriers component of the health belief model have been incorporated into an examination of the stages of change with regard to reductions in dietary fat (McDonell *et al.*, 1998). Respondents in the precontemplation stage perceived fewer benefits of reducing dietary fat than all other groups, while those in the maintenance stage perceived fewer barriers than did any other group (McDonell *et al.*, 1998).

It is in the first stages of change that people gather information about themselves and their behaviour, such as dietary behaviour (Norman & Conner, 1996). Information and other motivational strategies can be tailored to suit people who are at a particular

prompting behavioural change.

stage of change in order to maximise the chance of them moving to the next stage. This may in turn lead to long-term behaviour change (Maibach & Holtgrave, 1995).

The stage of change model was applied in a survey of the attitudes of European adults towards making dietary changes to eat healthier foods (de Graaf, Van der Gaag, Kafatos, Lennernas, & Kearney, 1997). The study found that 52% of the subjects were in the precontemplation stage, and 31% in the maintenance stage. Two percent of subjects were in the contemplation stage, one percent in the decision stage, and seven percent were in the action stage. Major differences were found in the proportions of people at various stages of change according to sex and education level. For example, 61% of respondents educated to the primary level were in the precontemplation stage, and 26% were in the maintenance stage. When the level of education was higher, the greater was the size of the maintenance group. A higher proportion of women were in the maintenance stage than men (36% and 26% respectively), while 59% of men were in the precontemplation stage, compared to 46% of women. Most people in the precontemplation stage (64%) did not look for information on healthy eating, whereas most (66%) in the maintenance stage did look for this information. With regard to meat, 26% of those in the maintenance group had achieved or considered eating less, compared to 21% in the dynamic stage (comprised of contemplation, decision and action stages). The stage of change model has also been applied to willingness to meet grain, fruit and vegetable guidelines (Ling & Horwath, 2000).

In contrast to the stage of change model, which emphasises individual change, diffusion of innovations theory is a theory of community behavioural change.

Diffusion of innovation research studies how new ideas and practices, such as healthy eating patterns, spread throughout society. It is generally accepted that there are five stages in the innovation decision process: (1) knowledge - when an individual is exposed to an innovation and gains some understanding of how it functions, (2) persuasion - when a favourable or unfavourable attitude is formed towards the innovation, (3) decision - when activities are engaged in that lead to rejection or adoption of the innovation, (4) implementation - when an innovation is put into use, (5) confirmation - when reinforcement of an innovation decision or reversal of decision occurs (Rogers, 1983). Individuals can be classified according to their rate of adoption of a particular innovation as (1) innovators, (2) early adopters, (3) early majority, (4) late majority or (5) laggards (Rogers, 1983). An innovation is likely to be adopted if it is compatible with the current beliefs, values and behaviours of adopters and if its benefits, risks, flexibility, reversibility, complexity, and cost efficiency outweigh those of current ideas and practices (I. Contento *et al.*, 1995). It appears that vegetarianism, as a social process of change, is currently at an early stage of innovation, and it is not known whether it will develop beyond this stage.

This thesis will utilise a combination of the above models, in recognition of the complexity involved in food choice. Attitudes (or their cognitive component: beliefs), social norms, perceived benefits and barriers are all used, as is a unique version of the stage of change model, where the theory is similar but the method differs. The latter also has implications for the diffusion of vegetarianism. Other variables from more general models, such as values, are also considered. Together, these and other variables discussed below will help to characterise and understand the public's views

on meat and vegetarianism, and how dietary change can be most effectively implemented.

1.3.5 Information and information sources as predictors of behaviour

An important element of this thesis is information and the sources of food, health and nutrition information used and trusted by consumers. This is because one of the research goals is to identify the messages that could most effectively influence consumers' beliefs about meat and vegetarianism, and hence, possibly their dietary behaviour. Sources of information are a focus because (a) they play a role in influencing dietary beliefs and behaviours via the particular information they disseminate and therefore may be important influences on current consumer perceptions of meat and vegetarianism and (b) identifying the sources used and trusted by consumers who hold negative beliefs about meat and consumers who hold positive beliefs about meat would allow the use of the most appropriate source for information dissemination as part of a strategy to influence meat and plant food consumption. Therefore, this section will examine information and information sources and how they are associated with behaviour.

Information defined

One definition of *information* is that it “refers to a reduction of uncertainty that can be measured in bits; while *meaning* refers to the making sense of information, to the finding of a meaningful pattern” (based on Klapp, 1978; Klapp, as cited by Severin & Tankard, 1992, pg. 7). Dervin suggests that “information is not a thing that exists independent of and external to human beings but rather is a product of human observing, [which] is seen as applying equally to “direct” observations of reality as

well as to observations of the observations made by others (i.e. the stuff usually called “information”)” (Dervin, 1983, pg. 4). Thus, the *subjectivity* of information is taken into account. The interaction between individuals in selecting and interpreting information is vital.

Mass communication defined

Communications through mass media are a significant and persuasive component of the information received by consumers today (Glanz *et al.*, 1995; MacLaren, 1997; Nestle *et al.*, 1998). The mass media are highly used and moderately trusted by consumers for food and nutrition information, as discussed below. Furthermore, mass media communications are an important element of public health nutrition education (Economos *et al.*, 2001). Therefore, mass communication and the role of mass media in shaping beliefs and behaviours will be a key theme for discussion in this section of the thesis.

Forty years ago mass communication was defined by the following characteristics: “(1) It is directed toward relatively large, heterogenous, and anonymous audiences; (2) Messages are transmitted publicly, often timed to reach most audience members simultaneously, and are transient in character; (3) The communicator tends to be, or to operate within, a complex organization that may involve great expense” (Wright, 1959, pg. 15). However, this definition of mass communication has been changing over the past few decades, particularly as a result of the development of new technologies such as the VCR, CD-ROM, on-line databases and the Internet (although it must be noted that these technologies are only accessible to a mere fraction of the world’s population (Milio, 2001)). Mass communication has become harder to define

as the boundary between mass communication and other communication forms blurs (Severin & Tankard, 1992).

Role of the mass media

The mass media have an important role in value, belief and attitude formation or reinforcement and other sociocultural aspects of food (Economos *et al.*, 2001; McIntosh & Guseman, 1985). The systems of mass communication are an information network tied loosely to social networks that include family, friends, neighbours and colleagues. People who do not often use mass media may still be influenced by it through people in their social networks who *do* make use of it and are influenced by the messages.

Advertising is a prominent component of the mass media. The food industry spends millions of dollars every year promoting their products, in comparison to which the budget for nutrition education is miniscule (Gussow & Akabas, 1993; Nestle, 1998). For example, in the United States, one million U.S. dollars was spent on developing the Food Guide Pyramid, while \$64 million was spent in 1996 advertising M&Ms chocolate candy (Nestle, 1998). Advertising has a cultural role in *influencing* values and beliefs, rather than simply *mirroring* them (Nestle *et al.*, 1998; Pollay, 1987; Pollay & Gallagher, 1990), as does the mass media in general. Advertising is only modestly informative (Pollay & Gallagher, 1990). Pollay and Gallagher (1990) analysed a random representative sample of two thousand United States mass circulation magazine advertisements from 1900-1980 and found only a modest amount of information present. The *symbolism* attached to food-stuffs is often used in

advertisements to appeal to the audience, not information. Thus, it is values, lifestyles and dreams that are being promoted, not simply the product (Fieldhouse, 1986).

Sources of information

Much research has been conducted on the information sources utilised by the general population, with regard to nutrition and health (American Dietetic Association, 1997a; Begley & Cardwell, 1996; de Almeida *et al.*, 1997; Falk, Sobal, Bisogni, Connors, & Devine, 2001; Kunkel, Cody, Davis, & Wheeler, 1986; Lambert-Lagace, 1983; McIntosh, Kubena, & Usery, n.d.; Novascone & Hertzler, 1986; O'Keefe, Hartwig Boyd, & Brown, 1998; Radimer & Harvey, 1995; Rakowski *et al.*, 1990; Reilly, 1985; K. M. Richardson, Cheung, Wahlqvist, & Hsu-Hage, 1998). For example, a European Union survey found that the most frequently used sources of information on healthy eating were television/radio (used by 29% of the sample for information on healthy eating), magazines and newspapers (27%), health professionals (26%), food packages (22%), and relatives and friends (22%) (de Almeida *et al.*, 1997). Similarly, a survey of the sources of nutrition information among Americans found television to be the major source, followed by magazines and newspapers (American Dietetic Association, 1997a). A Queensland (Australia) study found that magazine articles were the source of nutrition information found useful by the highest percentage of survey participants, followed by food labels, television shows, National Heart Foundation information, and books (Radimer & Harvey, 1995). When participants were asked to report the “more useful” sources of nutrition information, magazine articles were listed first, with television second. In a pilot study conducted by Richardson *et al.* (1998), the most accessible sources of nutrition information were brochures, pamphlets, Internet sites and magazines or newspapers. Identifying the

information sources used by particular dietary groups or populations can help public health workers target these groups (Novascone & Hertzler, 1986). For example, recent Australian research has identified that interactive information sources, such as doctors and pharmacists, have the potential to most strongly influence the folate use of pregnant women (Flight, Moore, & Worsley, 2001). An additional example, from a United States study, is that nutritionists and the media are utilised by those who define healthy eating as "balance", while health professionals, classes, and reading materials have the most potential to influence those who define healthy eating as "weight control" (Falk *et al.*, 2001).

Types of information

Nutritional topics of interest to the public were identified by Richardson *et al.* (1998). These included weight management, food additives, nutrition and heart disease, food safety and labelling, low-cost healthy meals, vegetarian diets and adolescent nutrition. It is expected that the information utilised by vegetarians will follow different themes to that utilised by non-vegetarians. For example, a cursory look at the Australian magazine *New Vegetarian and Natural Health* over the past year reveals articles about organic food production, the disease and nutrition link, general vegetarian nutrition, smoking, ethics, vivisection, alternative therapies, genetic engineering, and vaccination. Many vegetarians are interested in the wider issues linked to diet and health (Amato & Partridge, 1989; Beardsworth & Keil, 1991, 1992; Hess *et al.*, 1993; Rozin *et al.*, 1997; Santos & Booth, 1996) .

The health and nutrition information available in the mass media is heterogenous. For example, many magazines and television programs present unfounded dietary

instructions alongside scientifically based directions as though they were equally legitimate (Lindeman, Keski-Vaara, & Roschier, 2000). For instance, the July 2000 issue of the Australian magazine *Good Medicine* included an article on eating according to your constitutional Ayurvedic type (vata, pitta or kapha) and an article written by an orthodox dietitian.

Contradictory and misleading information

Health messages are sometimes ambiguous or impractical, or at least are perceived to be. One study found that over 80% of survey respondents believed that there are many conflicting messages about healthy eating (Goode, Beardsworth, Keil, Sherratt, & Haslam, 1996). Consumer confusion about dietary advice may result from ambiguous dietary communications from government organisations, conflicting media reports about research on single nutrients, and messages from food advertisers who are concerned solely with product sales (Nestle, 1998). Contradictory nutritional/health research and information reported in the popular press may be due to scientists disagreeing with a particular position or stories being released before the full research is completed, as consensus amongst the scientific community may not be possible at such an early stage (Buttriss, 1997; Goldberg & Hellwig, 1997; Yeaton, Smith, & Rogers, 1990).

Misinformation in the media is a problem. Much knowledge about nutrition, for example, comes from the mass media, and this knowledge can form a basis for attitudes towards various food-stuffs (McIntosh & Guseman, 1985). It is therefore important that information is accurate. Some early research showed that accuracy was lacking in Australian women's magazine articles on nutrition (Reilly, Yann, &

Cumming, 1987), although the situation may be improving (Begley & Cardwell, 1996). A study of Queensland newspapers found that the nutrition information published was reasonable, and that the possible link between diet and disease was recognised (Reilly, 1985). Recent research emanating from the United States has found that although there is a stronger emphasis on diet in the mass media and researchers are now the most prominent source of food information for news reports, news accounts are less likely than they were in 1997 to link health claims to scientific research (Stahl, 2000). For example, generally, specific studies were not cited (Stahl, 2000). In addition, it was found that only a limited number of journals were used as sources of information for United States newspaper articles (Hackman & Moe, 1999).

Influences on information selection

The mass media audience should not be seen as passive, but rather as “active and selective in their use and interpretations of mass media messages” (Hoijer, 1992, pg. 583). The audience is independent to some degree (Corner, 1996). For example, according to Begley and Cardwell (1996), there is evidence of consumer suspicion towards magazine articles on health. People's varying values, attitudes, lifestyles and demographic variables (such as age and education (e.g. McIntosh & Guseman, 1985)) may lead them to view information differently. The following paragraphs will examine the associations between some of these factors and the selection of information.

Information selection

According to the theory of cognitive dissonance (Festinger, 1957), which argues that people strive for cognitive consistency among their own attitudes, beliefs and personal

values, information may be selected to minimise dissonance (Frey, 1986). That is, information that supports the beliefs and viewpoint of an individual is favoured. Beard *et al.* (1989), for example, found that this was the case in their qualitative study of eating habits in New Zealand. Respondents chose to accept information that concurred with their attitudes and beliefs about food and how the body operates (Beard *et al.*, 1989). Frey (1986), however, has found some exceptions to this. He found that there are two situations where dissonant information is searched for or selective exposure is small. The first is when the dissonant information can be incorporated, such as when it can easily be argued against (e.g. a non-vegetarian of acceptable body-mass index may easily be able to refute information about meat being fattening), which serves to further stabilise the cognitive system. The second is when the cognitive system is unstable enough for it to be preferable to change the system rather than add more consonant information (e.g. a non-vegetarian who has recently begun to believe that meat is unhealthy may seek out information on factory farming and, as a result, become a vegetarian). Vegetarians presumably experience the latter for their dietary shift from meat eating to occur.

Health messages that are threatening may be believed to be not so serious by an individual who is participating in this health-threatening behaviour, compared with someone who is not. This was found to be the case for coffee drinkers (Lieberman & Chaiken, 1992). Coffee drinkers discounted threats to the self when processing the threatening information. It is possible that this selective interpretation of information is carried out by meat-eaters (or vegetarians) when confronted with messages proclaiming the unhealthiness of their diet, thus acting as a barrier to change. Eagley and Chaiken (1993, pg. 569) stated that "...when people receive persuasive messages

that they construe to be threats to their attitudinal freedom, they attempt to reassert their freedom by maintaining their initial options or, more provocatively, by changing their opinions in a direction opposite to the position advocated in the message, a shift often termed a boomerang effect". This reinforces the importance of tailoring health and nutrition communications to correspond to the beliefs and perceived benefits and barriers to change of the population, or segment of the population.

Trust in information sources

The *trust* placed in information sources is an important factor to consider. Greater attention will usually be given to the information emanating from a respected source (for example, see the study by Heesacker, Petty, & Cacioppo, 1983), which may lead to attitude and behavioural change (McGinnies, 1968). For example, members of the United Kingdom Vegetarian Society were found to trust information on meat published by the Society more than did the general population, while the latter trusted the Meat and Livestock Commission and government leaflets more highly (N. J. Richardson, Shepherd *et al.*, 1994). This United Kingdom study also found that food labels were relatively highly trusted by both the general population and by members of the Vegetarian Society as a source of meat-related information. A South Australian survey found that formal sources of health information, particularly the family doctor and pharmacist, were considered the most reliable, with commercial and media sources of health information, such as newspaper and magazine articles, and television advertisements, the least reliable (Worsley, 1989). Similarly, a European Union study found that health professionals and government agencies were trusted as sources of information on healthy eating by almost all respondents (91% and 80% respectively), while food packages, television, radio, newspapers and magazines were

intermediate, and advertising was trusted by the lowest proportion of respondents (25%) (de Almeida *et al.*, 1997) .

Demography and information sources

Demographic differences alter the sources of information most readily available to people, as well as the processing of the information. It has been proposed that the lowest social classes have limited information sources and more often rely on significant others for information rather than on the media (Engel, Blackwell, & Miniard, 1995). In contrast, the middle-class actively searches for information from the media. Access to media information is said to increase as the level of social class increases (Engel *et al.*, 1995; Weenig & Midden, 1997). Those people who are well educated generally utilise the printed media such as books and magazines more than do the less well educated (McIntosh & Guseman, 1985). A United States survey found that the search for nutrition information from most sources increased as education increased, although there was no significant correlation between education and television programs used as a source of nutrition information (Feick, Herrmann, & Warland, 1986). Feick *et al.* also found that age was a significant predictor of searching for nutrition information in newspapers, magazines, books and pamphlets. This is in agreement with a later study by Kassulke *et al.* (1993) in Australia, where older people searched more actively for health information than younger people. A New Zealand study found that the elderly used doctors more often than other sources of nutrition information and many considered them to be the most trustworthy and reliable (Silvester & Horwath, 1991). Studies have shown that women are more likely than men to look for and obtain health information (Kassulke *et al.*, 1993; O'Keefe *et al.*, 1998; Rakowski *et al.*, 1990). It is suggested that it is those people who spend the

most time searching for nutrition information who see nutrition as important (Feick *et al.*, 1986).

Ingredient lists and nutrition labels were found to be used more by young, white, female and better educated people, in a United States study conducted in the 1980s (Bender & Derby, 1992). The challenge is to educate those groups in the population who do not use particular sources of information (Bender & Derby, 1992).

Information processing

The processes that take place between the reception of messages from the media and the learning, attitudes, beliefs and behaviours resulting from this lies in the realm of information processing (Geiger & Newhagen, 1993). People interpret and integrate information from the socio-environment, and information processing is the mental processes by which this is done. The individual must be exposed to information, pay attention to it, understand it, and transfer it to their long-term memory (Craig-Lees, Joy, & Browne, 1995), where the stored information is known as knowledge (Engel *et al.*, 1995). It is only then that the information may be acted upon by the individual, through their behaviour (Craig-Lees *et al.*, 1995; H. A. Simon, 1990).

Prior knowledge is one of the factors that influence information processing (Brucks, 1985). The new information is analysed in relation to the information that is already stored in the memory. Associative networks are generated cognitively, linking up information (Markus, Hamill, & Sentis, 1987). Thus, hearing about or seeing a particular food or food-related item may trigger thoughts about another food or food-related item. One example is associating McDonalds with hamburgers. For people

such as environmentalists or vegetarians it is possible that they have broader associative networks for food or food-related items. “McDonalds” may conjure up thoughts about big business, destruction of rainforests and the like. The information that is already stored in the memory influences whether new information is accepted or not.

There are models for low involvement with a topic or body of content, and for high involvement. The former is called peripheral processing by Petty and Cacioppo in their Elaboration Likelihood Model of Persuasion, a model of attitude change (Petty & Cacioppo, 1986). Central processing, in contrast, occurs when the topic is cognitively¹³ or affectively¹⁴ highly involving. Change is more enduring when central processing occurs (Petty & Cacioppo, 1986).

Schemas

Epstein (1994), in his cognitive-experiential self-theory, proposes that there are two interacting modes of information processing: a rational system and an experiential system. *Beliefs* are important in the rational system, while *schemata* are important in the experiential system. “In a nutshell, a schema is a cognitive structure consisting of organized knowledge about situations and individuals that has been abstracted from prior experiences. It is used for processing new information and retrieving stored information” (Graber, 1984, pg. 23). The schema concept can be used to understand how information is searched for, acquired, and processed (Harris, 1994). Schemas also guide behaviour in response to this information (Harris, 1994). Information that does not fit in with the current beliefs, attitudes or behaviours of an individual may be

¹³ The cognitive deals with our knowledge of things (Severin & Tankard, 1992, pg. 5).

discarded (Frey, 1986; Severin & Tankard, 1992). Alternatively, schemas may change as a result of new information, although it is unlikely that drastic changes will be made due to the existing schema having guided the search for information (Harris, 1994).

Information and behaviour change

Information does not necessarily lead to a change in behaviour (Conner & Norman, 1996; Looker & Shannon, 1984): behaviour change is much more complex. However, actively searching for information is a much stronger indication that behaviour change could occur, compared to the acquisition of information in more passive ways (Rakowski *et al.*, 1990). Furthermore, if dietary communications are highly involving (e.g. they involve central processing (Petty & Cacioppo, 1986)) and are appropriate for the schemata of the intended audience, attitude and behavioural change are more likely to occur. The knowledge-attitude- behaviour model posits that persuasive communications influence beliefs and attitudes, which leads to behavioural change (I. Contento *et al.*, 1995; Gussow & Contento, 1984; McGuire, 1969; Sapp, 1991).

Goldberg and Hellwig (1997) believe that the media, as a source of information, have a strong effect on health behaviours and attitudes. For example, media coverage in the United States advising a reduction in saturated fat by switching from butter to margarine resulted in a large increase in margarine sales and a drop in butter sales and prices (Goldberg & Hellwig, 1997). Similarly, the "1% Or Less" mass media campaign in Wheeling in the United States resulted in an increase in low-fat milk

¹⁴ The affective deals with our attitudes towards things (Severin & Tankard, 1992, pg. 5).

sales from 29% of total milk sales to 46% in the month following the campaign and 42% at the six-month follow-up (Reger, Wootan, & Booth-Butterfield, 1999). McIntosh also found support for the effect of diet-health messages via the media on behaviour (McIntosh *et al.*, n.d.). A very high percentage of respondents in an Australian study had found useful nutritional information in the media, especially television and magazines (Radimer & Harvey, 1995).

An understanding of how people process information can lead to more effective communication strategies, such as in the area of nutrition (Craig-Lees *et al.*, 1995). It is vital that accurate messages that allow people to take positive steps towards improving their diet are conveyed (Goldberg & Hellwig, 1997; Radimer & Harvey, 1995). Furthermore, these messages need to be tailored to suit the particular schemata of the intended audience (e.g. men, young people, vegetarians) (American Dietetic Association, 1996; Lefebvre, Lurie, Saunders Goodman, Weinberg, & Loughrey, 1995). In order to do this, consumers' beliefs, attitudes, values, perceived barriers and benefits of change and other characteristics need to be examined. This thesis aims to identify consumer characteristics with regard to meat and vegetarianism and the most appropriate sources to utilise for dietary communications, so as to (a) expand knowledge of this area and (b) provide a base for appropriate (tailored) information dissemination and other interventions.

1.3.6 Possible factors associated with meat consumption and meat beliefs

Beliefs are an important influence on behaviour (e.g. Sapp, 1991). This thesis will examine whether beliefs are an important determinant of meat consumption among adult South Australians, as has been found by studies of young South Australians and

citizens of the United Kingdom and United States (N. J. Richardson *et al.*, 1993; Worsley & Skrzypiec, 1998a; Zey & McIntosh, 1992).¹⁵ However, the social-cognitive origins of meat-related beliefs and attitudes are obscure. Therefore this thesis will examine a number of factors that may be associated with both negative and positive beliefs about the healthiness of meat and vegetarianism. These include other beliefs about meat and about nutrition, barriers to and benefits of vegetarian diets, number of vegetarian friends and family, personal values, use of and trust in nutrition, food and health information sources, and demography.

1.4 VEGETARIAN DIETS AND HEALTH

Vegetarian and other plant-based diets have important implications for public health. There have been a number of studies and reviews on the health effects of consuming a vegetarian diet, including the differences in nutrient intake and disease risk between vegetarians and non-vegetarians (American Dietetic Association, 1997c; Appleby, Thorogood, Mann, & Key, 1999; Beilin, 1994; Bingham, 1999; Dwyer, 1988, 1991; Janelle & Barr, 1995; Key, Thorogood, Appleby, & Burr, 1996; Key, Davey *et al.*, 1999; Key *et al.*, 1998; Key, Fraser *et al.*, 1999; Knutsen, 1994; Sanders & Reddy, 1994; Thorogood, Mann, Appleby, & McPherson, 1994; White & Frank, 1994).

There are potential confounding factors when comparing the health and nutrition of vegetarians with non-vegetarians (Beilin, 1994). For example, studies have shown that many vegetarians exercise more than the average, are non-smokers, and consume little if any alcohol, as mentioned above (e.g. Walter, 1997). However, these factors can be controlled for, as they were in the studies discussed here.

¹⁵ Note that these studies will be discussed in Chapter 6, which covers the predictors of meat

Researchers and organisations, such as the American Dietetic Association (1997c) and Sanders (1999), have shown that it is entirely possible to obtain all of the necessary nutrients from a vegetarian diet. Vegetarian diets can provide adequate amounts of essential amino acids, iron, vitamin B-12, calcium, vitamin D and zinc at all stages of the life cycle, but they must be well planned (American Dietetic Association, 1997c). They should include sufficient quantities of a variety of fruits, vegetables, legumes, nuts, seeds and grains (Haddad, Sabaté, & Whitten, 1999; Sanders, 1999). Poorly planned vegetarian diets may entail the risk of not meeting the needs for some nutrients, particularly iron, zinc and vitamin B-12 (Dwyer, 1991; Mann, 2000). This is because the bioavailability of iron and zinc from plant foods is lower than it is for meat, and the primary dietary sources of vitamin B-12 are animal products (meat, eggs and milk) (Herbert, 1994; Hunt, 1996; Snow, 1999).¹⁶ Although mean serum ferritin levels are lower in vegetarians than non-vegetarians, clinical anaemia does not appear to be more common among vegetarians (Alexander, Ball, & Mann, 1994; Mann, 2000), at least in Western countries (Dwyer, 1988). In addition, a recent Australian study found that lacto-ovo-vegetarians did not have a significantly greater risk of low zinc status than omnivores, despite a lower daily zinc intake in female (but not male) vegetarians compared to female omnivores (Ball & Ackland, 2000).

Well-planned vegetarian diets provide some health and nutrition benefits. They are lower than standard diets in saturated fat, cholesterol and animal protein, and higher in folate, antioxidants (such as vitamins C and E), fibre, carotenoids and phytochemicals (American Dietetic Association, 1997c). A number of studies have shown that,

consumption.

compared to non-vegetarians, vegetarians have a lower mean body-mass index, plasma total cholesterol concentration, low-density lipoprotein cholesterol level, and blood pressure (Appleby, Thorogood, Mann, & Key, 1998; Famodu, Osilesi, Makinde, & Osonuga, 1998; Kennedy, Bowman, Spence, Freedman, & King, 2001; Key, Fraser *et al.*, 1999; Li *et al.*, 1999; Thomas *et al.*, 1999). One study has shown that mortality from ischaemic heart disease is decreased by 24% in vegetarians compared to non-vegetarians (Key, Davey *et al.*, 1999; Key, Fraser *et al.*, 1999). All-cause mortality rates are also lower. For example, the Oxford Vegetarian Study found that the death rate ratio for all cause mortality for non-meat-eaters compared with meat-eaters was 0.80, after adjusting for smoking, body-mass index and social class (Appleby *et al.*, 1999).

The high saturated fat content of meat (and the link to obesity) and the higher intake of protective factors such as fruits, vegetables, nuts and wholegrain cereals by vegetarians, rather than meat *per se*, may be the main reason for the lower incidence of some diseases in vegetarians (e.g. Hill, 1999; Thorogood *et al.*, 1994). Indeed, both vegetarian plant-based diets and plant-based diets that contain some meat offer health benefits (Dwyer, 1999). Increased fruit and vegetable consumption has a positive effect on health. For example, as fruit and vegetable intake is increased, the risk of ischaemic stroke is decreased (Joshiyura *et al.*, 1999). Cardiovascular and total mortality has been found to be significantly lower among Swedish men with a high fruit intake than among those with lower fruit consumption (Strandhagen, Hansson, Bosaeus, Isaksson, & Eriksson, 2000), and this was also the case in a British

¹⁶ Note that vitamin B-12 deficiency is therefore a greater problem for vegans rather than for lacto-ovo-vegetarians, as the latter consume milk and eggs (Herbert, 1994). However, vegan foods fortified with vitamin B-12 are available, such as some soy drinks (American Dietetic Association, 1997c).

study of both men and women (Key *et al.*, 1996). A recent review of over 250 observational studies on cancer and cardiovascular disease estimated that cancer incidence and cardiovascular deaths in the Netherlands could be reduced by 19% and 16% respectively if the intake of fruit and vegetables was increased from the current 250g per day to the 400g per day that is recommended (van't Veer, Jansen, Klerk, & Kok, 2000).

The important health benefits provided by plant-based diets in general, such as those mentioned above, are increasingly being recognised by health organisations and researchers (American Dietetic Association, 1997c; Bingham, 1999; Dietitians Association of Australia, 2000; Dwyer, 1999; Potter, 2000; World Cancer Research Fund & American Institute for Cancer Research, 1997). Plant-based diets conform more closely to public health recommendations than do conventional diets (National Health and Medical Research Council, 1992; US Department of Health and Human Services, 2000; World Cancer Research Fund & American Institute for Cancer Research, 1997).

Some studies have observed an association between level of meat consumption and level of nutrients or foods in the diet. Slattery *et al.* (1991) found that low meat consumers (less than once per week) had diets higher in carbohydrates, fibre, starch, calcium and vitamins A and C, but lower in fat, protein and energy compared with higher consumers of meat. Likewise, in a study of young adults as part of the Bogalusa Heart Study, participants in the lowest quartile for meat consumption had higher intakes of calcium and carbohydrates and lower intakes of fat and protein than those in the highest quartile (Nicklas, Farris, Myers, & Berenson, 1995). However,

fewer young adults in the lowest meat consumption group met two-thirds of the recommended dietary allowances (RDAs) for zinc, niacin and vitamin B-12 compared to those in the highest group. In a more recent study, by Elmståhl *et al.* (1999) in Sweden, negative correlations between level of meat consumption and vitamin C and fibre were found. This Swedish study also found that as meat consumption increased, consumption of fruit, cereals, bread, fish, poultry and cheese decreased. An examination of the association between self-reported fruit and vegetable consumption and red meat intake among Australians found that non-red meat consumers and the category of red meat consumers with the highest intake had the greatest fruit and vegetable consumption, with the two intermediate red meat intake categories having the lowest fruit and vegetable consumption (Baghurst, 1999). Therefore, the amount of plant foods consumed may vary according to the amount of meat consumed. Most studies found that the more meat was consumed, the fewer servings of fruits and vegetables were eaten, although for one study (Baghurst's) it was only the moderate meat consumers (over 60% of men and 65% of women) who consumed the least number of servings of fruit and vegetables. It has been posited that the centrality of meat for most people may interfere with the health message to consume more fruit and vegetables (M. Simon, 1998).

There may be health-related economic benefits associated with a decrease in meat consumption. Disease prevention is likely to be much less expensive than treatment (W. P. T. James, 1988). The consumption of vegetarian and other plant-based diets may reduce the prevalence of chronic disease, and the use of medication and health services (Knutsen, 1994). Hence, the cost of health care may be decreased (Barnard, Nicholson, & Howard, 1995; Knutsen, 1994). In Australia, it is estimated that the

diet-related conditions of cardiovascular disease, stroke and cancer cost the nation about \$6 billion per annum (National Health and Medical Research Council, 2001).

In summary, the level of meat consumption of the population impacts on public health. It has been argued that there are clear benefits associated with vegetarian and other plant-based diets, although there are also some risks of deficiency in certain nutrients if these diets are not well planned. However, the population's beliefs about the healthiness of meat and vegetarianism are likely to differ to the nutrition and disease-risk research findings discussed above, and the focus of this thesis is on the beliefs of the population. Without an understanding of the psychosocial and sociodemographic factors associated with meat consumption and beliefs, it is not possible to begin to develop strategies to enable the public to obtain any of the possible benefits of vegetarian and other plant-based diets, or to minimise the associated risks.

Chapter 2

AIM AND HYPOTHESES

2.1 STUDY AIM

The overall aim of the study is to examine South Australians' perceptions of meat and vegetarianism and thus to elucidate ways to further promote the consumption of healthy vegetarian, and other, plant-based diets. In order to achieve this, it was considered important to:

1. Via surveys, describe and examine the differences and similarities between South Australian vegetarians', semi-vegetarians' and non-vegetarians' beliefs about meat and perceived barriers and benefits of vegetarian diets, as well as their use of and trust in sources of food, health and nutrition information and their personal values, as these are likely to be associated with their beliefs and level of meat consumption.
2. Examine the associations between level of meat intake and people's beliefs, including perceived barriers and benefits of vegetarian diets, personal values, use of and trust in information sources, number of vegetarian friends and family, and demographic variables.
3. Examine their health-related sets of beliefs about meat and vegetarianism and determine the factors that are associated with them, including use of and trust in information sources.

4. Calculate the prevalence of, and describe the characteristics of, those non-vegetarians who hold similar beliefs about meat and vegetarianism as vegetarians and therefore may be prospective vegetarians.

2.2 RESEARCH HYPOTHESES

Hypothesis 1 There are differences between vegetarians, semi-vegetarians and non-vegetarians in the study with regard to their beliefs about meat and vegetarianism, barriers and benefits of vegetarian diets, use of and trust in health, food and nutrition information sources, and personal values.

- 1.1 It was predicted that vegetarians would be less likely than non-vegetarians (with semi-vegetarians intermediate) to:

- a. hold positive beliefs about meat and to believe there are barriers to eating a vegetarian diet
- b. use and trust orthodox sources, mass media and advertising
- c. hold values related to "power" and "tradition" in high regard.

- 1.2 Vegetarians are more likely than non-vegetarians (with semi-vegetarians intermediate) to:

- a. believe that there are benefits involved with eating a vegetarian diet
- b. use and trust unorthodox sources
- c. hold personal values associated with equality and the environment ("universal" values) in high regard.

Hypothesis 2 Level of meat consumption is associated with a variety of beliefs, barriers and benefits of vegetarian diets, personal values, use of and trust in food, health and nutrition information sources, number of vegetarian significant others, and demographic characteristics.

2.1 Positive predictors of frequency of meat consumption were hypothesised to be:

- a. meat appreciation
- b. beliefs about the healthiness or necessity of meat
- c. perceived barriers to vegetarian diets
- d. use of and trust in the mass media, advertising and orthodox sources of food, nutrition and health information
- e. having children living in the household (likely to be a weak predictor only)
- f. holding power and tradition-oriented personal values (likely to be weak predictors only).

2.2 Negative predictors of frequency of meat consumption were hypothesised to be:

- a. perceived benefits of vegetarian diets
- b. the use of and trust in unorthodox sources of information
- c. the presence of vegetarian significant others
- d. holding universal personal values (likely to be a weak predictor only).

2.3 Women and members of older age groups were expected to focus more on health factors than men and younger people.

2.4 Although it was expected that demographic variables would be weak predictors overall, it was hypothesised that the predicting variables would differ depending on age, sex, and dietary group.

Hypothesis 3 Health-related beliefs about meat and vegetarianism are related to other health-related beliefs and non-health related beliefs, barriers and benefits of vegetarian diets, personal values, use of and trust in information sources, and number of vegetarian significant others.

3.1 It was predicted that positive health beliefs about meat and perceived barriers to vegetarian diets would be positively associated (and negative health beliefs about meat and perceived benefits of vegetarian diets would be negatively associated) with:

- a. other positive health and non-health related beliefs about meat and perceived barriers to vegetarianism (such as enjoyment of eating meat and perceived inconvenience of vegetarian diets)
- b. having fewer vegetarian significant others
- c. use of and trust in orthodox sources, mass media and advertising
- d. holding more tradition and power-oriented values.

3.2 Conversely, it was predicted that negative beliefs about the healthiness of meat and perceived health benefits of vegetarian diets would be positively associated (and positive beliefs about the healthiness of meat and perceived barriers to vegetarian diets would be negatively associated) with:

- a. other negative beliefs about meat and believing that there are benefits associated with vegetarian diets (such as animal welfare and environmental benefits)
- b. use of and trust in unorthodox information sources
- c. holding universal values.

Hypothesis 4 Some non-vegetarians hold similar beliefs to vegetarians. In particular, some non-vegetarians may have health, environmental, or animal welfare concerns about eating meat and perceive there to be certain benefits associated with the consumption of a vegetarian diet.

2.3 RATIONALE AND CHAPTER OUTLINE

The surveys that this work was largely based upon generated large quantities of data. Therefore a rationale for the inclusion of particular data is outlined below, chapter-by chapter.

- Chapter 5 examines the differences and similarities between vegetarians', semi-vegetarians' and non-vegetarians' beliefs about meat and vegetarianism, including barriers and benefits of the consumption of a vegetarian diet, general nutrition beliefs and behaviours, level of use of and trust in a variety of food, health and nutrition sources of information, and personal values.

- It is important to know the factors, such as beliefs, personal values and demographic characteristics, that are directly associated with behaviour. Therefore Chapter 6 examines the factors that are associated with meat consumption.

- Beliefs and attitudes are known to mediate behaviour and it is important to learn possible ways of influencing people's beliefs. This thesis was written from a public health perspective and therefore the four subsequent chapters (Chapters 7-10) examine beliefs about the healthiness of meat and vegetarianism, both positive and negative.¹ The health beliefs are: (1) the belief that meat is necessary; (2) vegetarianism health concerns and appreciates meat; (3) meat is unhealthy; and (4) health benefits of vegetarian diets.

- The examination of health-related beliefs may lead to some change in beliefs and, ultimately, dietary behaviour, as it may facilitate the provision of appropriate information. However, the *source* of information is an important factor involved in whether or not this information is absorbed. Therefore, the level of use of and trust in sources of information about food, health and nutrition and how they are associated with beliefs and meat consumption is an important emphasis of this thesis. To this end, Chapter 11 examines a variety of information sources as predictors of each of the four health-related beliefs associated with meat and vegetarianism.

¹ These beliefs are also important as most were found to be predictors of meat consumption (Chapter 6).

- It is important to know the proportion of the population that may be able to be persuaded to adopt a more plant-based diet. Indeed, the new knowledge gained from this project may contribute to the implementation of the promotion of plant-based diets. Therefore, the final results chapter (Chapter 12) calculates the prevalence of "prospective vegetarians" and examines their characteristics.

Chapter 3

STUDY DESIGN AND METHOD

3.1 INTRODUCTION

Both qualitative and quantitative techniques were utilised to examine the beliefs and issues surrounding vegetarianism and meat consumption. Quantitative methods (such as randomised experiments and sample surveys) produce discrete numerical data, while qualitative methods (such as case studies and in-depth interviews) do not. The data for the latter are usually words, which are grouped into categories (Achterberg, 1988). From a small group of vegetarians,¹ the qualitative study provided detailed, personal perspectives on meat, vegetarianism and sources of food and health information. The quantitative studies provided quantifiable perspectives on meat, vegetarianism, sources of information and personal values from the general population and a larger portion of the vegetarian population. The quantitative studies provided the main data for the thesis.

¹ These interviews began only five months after the commencement of the PhD degree. At the time of the interviews, the intended focus of the PhD was predominantly on vegetarians' beliefs and information sources. Hence, interviews were conducted only with vegetarians. However, in subsequent months the aim of the research altered and developed to incorporate a stronger focus on the beliefs of non-vegetarians. Due to financial and time restrictions, the candidate was unfortunately unable to conduct a qualitative study that examined non-vegetarians' beliefs (section 13.5 of the final chapter suggests the importance of conducting interviews with non-vegetarians as part of future research). Nonetheless, the interviews with vegetarians were useful in helping to formulate the questionnaire and to at least provide greater insight into the beliefs of one of the dietary groups examined in this thesis (vegetarians). The results of the interviews with vegetarians are summarised in Chapter 5.

3.2 INTERVIEWS WITH VEGETARIANS

3.2.1 Interview method

This study used a qualitative research methodology. The interview form was the face-to-face non-scheduled standardised interview (unstructured schedule interview) (Denzin, 1978). Certain types of information were required from each respondent but the order and phrasing of questions varied between respondents (Denzin, 1978). “With this approach the interviewer will often find that interviewees will raise important issues not contained in the schedule, or will even summarize entire sections of the schedule in one long sequence of statements” (Denzin, 1978, pg. 115). The topics of conversation included motivations for becoming vegetarian, current sources of food and nutrition information and those sources that were used at the time of becoming vegetarian, level of trust in these information sources, and personal values. Appendix 1 lists the information elicited from participants.

3.2.2 Procedure

Respondents were recruited from the Adelaide² population identifying themselves as vegetarian by placing notices around the University of Adelaide and the University of South Australia campuses, two vegetarian cafés and two health food stores in the Adelaide city centre, as well as by word-of-mouth. About fifty people expressed an interest in participating, with a total of fifteen respondents being recruited.

All of the respondents were interviewed in rooms in the Department of Public Health, the University of Adelaide, located in the Royal Adelaide Hospital. Prior to the

² Adelaide is the capital city of the state of South Australia. It is a city with a population of 1, 045, 854. As noted in Chapter 1, the total population of South Australia is 1, 427, 936 (Australian Bureau of Statistics, 1996).

interview they each received an Information Sheet (Appendix 2) and signed a Consent Form (Appendix 3). Interviewing and analysis was undertaken solely by the candidate. The length of the interviews was, on average, forty-five minutes and the interviews took place between July 7 and September 14, 1998.

3.2.3 Sample characteristics

Qualitative studies usually involve only a small number of respondents because of the emphasis on detail and depth of the information (Beard *et al.*, 1989). Hence, only fifteen people were interviewed in this study.

Respondents were generally selected in order of their response to the notices, but there were some important exceptions; the majority of respondents were women so some men who expressed interest later on were included, as were some “health” vegetarians. Most people who responded were primarily ethical vegetarians, so it was considered necessary, for sample diversity, to ensure that both vegetarians who gave health as their main reason for vegetarianism and vegetarians who gave ethical reasons were included. Further details of the characteristics of the interviewees are included in Appendix 4.

3.2.4 Data analysis

All of the interviews were audio taped so analysis could take place. Interviews were fully transcribed. Analysis involved summarising the data and extracting the main themes. Each interview was summarised according to the information that was provided by interviewees, which followed the topics of the questions listed in Appendix 1 (e.g. main reason for becoming vegetarian). Next, quotes that aptly

illustrated each main theme (e.g. health benefits of vegetarian diets) were selected from a variety of interviewees.

3.2.5 Data presentation

The summarised results are presented as a series of vignettes throughout Chapter 5. They serve to provide an in-depth vegetarian perspective of trust in information sources, beliefs about meat, barriers to vegetarianism, and benefits of vegetarianism. The sex, age, and vegetarian status of each interviewee cited are documented in order to give a personal context to each quotation (see Appendix 4 for details of the vegetarian status labels that are used).

3.3 RANDOM POPULATION SURVEY

3.3.1 Procedure

One thousand people were selected at random from the South Australian population by using the software package Marketing Pro (April 1999 version, Desktop Marketing Systems Pty Ltd), containing a comprehensive list of residences from telephone directories. This form of selection was decided upon because it provided the most recent addresses possible, as well as telephone numbers as another avenue of follow-up contact. In addition, the software simplifies the selection and organisation procedures involved in conducting a survey.

The sample size was difficult to determine a priori, given the novelty of the questionnaire items. Therefore, the sample size was based on the sample sizes utilised

for other, similar (but different) surveys by experienced researchers (e.g. Crawford & Worsley, 1985; Worsley & Crawford, 1985a, 1985b; Worsley & Skrzypiec, 1998b).³

A twelve page booklet, ten pages of which contained questions (200 items), entitled *Food Choice, Information and Your Attitudes* was mailed to each person in the sample in May 1999, together with a cover letter and reply-paid envelope. The cover letter explained the purpose of the study and assured strict confidentiality of the information received. A copy of the letter is in Appendix 5. The design and administration of the questionnaire was based on Dillman's (1978) recommended methods for mail surveys.

A number of follow-ups to the original mailing were conducted in order to improve the response rate. Reminder postcards were sent to non-respondents two weeks after the initial mailing; after a further two weeks non-respondents were sent a follow-up letter and replacement questionnaire. After six weeks, the remaining non-respondents were contacted by telephone. Finally, questionnaires and letters were sent by registered post to a random selection (to 30 people, or 43%) of the 69 non-respondents who were unable to be contacted by telephone in order to ascertain if they were actually living at that address or not. The percentage of potential respondents who had moved from their last address could therefore be estimated.

3.3.2 Ethical considerations

The Adelaide University Human Ethics Committee operates under the guidelines of the National Health and Medical Research Council on research involving human

³ Indeed, the results demonstrated that the sample size was adequate to test the hypotheses.

participants. The Committee was informed about the study, but they said that official clearance was not required for this form of research. This was because no experimentation was involved, the survey topic was uncontroversial, the study did not represent any invasion of privacy or breach of confidentiality, subject identification was precluded, and all participation in the survey was on a completely voluntary basis ("Research Involving Human Subjects", subsection 10.14 of the Adelaide University Handbook of Administrative Policies and Procedures).

An identification number appeared on each questionnaire for the purpose of follow-up mailings, which negated any need for participants' names and addresses to appear on the questionnaire. Names and addresses were kept separate from the questionnaires and other data at all times, to further preclude identification of participants.

3.3.3 The questionnaire

The pilot questionnaire was formulated through an iterative process that was generated through the interviews with fifteen vegetarians about their food choices, information use and lifestyle (discussed above); from the literature (e.g. Fiddes, 1991; Freeland-Graves, Greninger, Graves, & Young, 1986; McIntosh, Fletcher, Kubena, & Landmann, 1995; N. J. Richardson *et al.*, 1993; Schwartz, 1992); and from three existing food choice questionnaires. The latter were the Institute of European Food Studies (IEFS) European Union survey on attitudes to food, nutrition and health (Kearney *et al.*, 1997), an Australian survey on meat consumption and attitudes (Worsley *et al.*, 1995), and Australian and New Zealand surveys of food concerns (Worsley & Scott, 2000).

Questionnaire pre-test. Two preliminary versions of the questionnaire were pre-tested among people of varying demographic characteristics. The first version was pre-tested among 206 non-vegetarian and vegetarian visitors at the Royal Adelaide Show in September 1998. The second pre-test was among 30 people. The final questionnaire was developed from the results. A copy of the final questionnaire is in Appendix 6.

The first section of the questionnaire had 20 items about respondents' concerns about particular food supply issues, such as genetic modification of foods and the safety of drinking water, based on Worsley and Scott's survey (2000). Respondents answered by indicating their level of concern with each issue on a five-point Likert-type scale. They were also able to describe any other concerns they might have with the food supply. This section was included in the questionnaire as part of another study and therefore will not be examined in this thesis. The results will be reported elsewhere.

The second section had 23 items about the frequency of use of sources of information about food, nutrition and health. The information sources included advertising, food labels, doctors and friends. Respondents indicated whether they "never", "rarely", "sometimes" or "often" used each source. An additional two items concerned whether respondents remembered whether the listed information sources promoted meat or vegetarianism in the last year or so. If they did, they were instructed to indicate the source responsible for the most promotion of that food type.

The third section consisted of 23 items about the level of trust in the information sources contained in section two. Level of trust was recorded on a five-point scale ranging between "distrust totally" and "trust totally".

The fourth section contained four items about general nutrition beliefs and behaviours (three of which were based on the IEFS European Union survey on attitudes to food, nutrition and health (Kearney *et al.*, 1997)) and 20 items on beliefs about meat (some of which were based on Worsley *et al.* (1995) questionnaire). Respondents answered by indicating their level of agreement with each belief on a five-point Likert-type scale, ranging between "strongly disagree" and "strongly agree".

Frequency of consumption of animal products was gauged in the fifth section (five items). Participants were asked to indicate how often they consumed red meat, white meat, fish and seafood, eggs and dairy: "never", "rarely", "one to three times a month", "one to four times a week", or "almost daily/daily".

The sixth section consisted of 12 items about vegetarianism which included: level of interest in vegetarianism, whether in the past month respondents had thought about making changes towards becoming vegetarian, how likely it was for them to become vegetarian in the future, whether they had ever been vegetarian, and current self-perceived dietary group (non-vegetarian, semi-vegetarian or vegetarian). Part of this section was modelled on the IEFS survey on attitudes to food, nutrition and health mentioned above (Kearney *et al.*, 1997). Respondents were also asked if they had vegetarian family members (circling either "none" or the type of family member/s,

such as "father" or "child/ren") or friends (with possible responses ranging from "none" to "all" on a six-point scale).

The seventh section was composed of 25 items about personal barriers to vegetarian diets, some of which were modelled on the IEFS survey (Kearney *et al.*, 1997). Respondents indicated their level of agreement or disagreement with each barrier on a five-point Likert-type scale. They were also asked to indicate their main barrier and could specify an additional barrier if they desired.

The eighth section assessed perceived benefits of vegetarian diets, including personal benefits and those with wider implications (24 items). Some parts were again modelled on the above-mentioned survey (Kearney *et al.*, 1997). A five-point scale was used to indicate level of agreement or disagreement, with instructions to indicate the most important benefit, as well as space for another benefit to be specified.

The ninth section consisted of 23 items about personal values. These were modelled on the values elucidated by Schwartz (1992); a short version of his inventory of over 50 values was used in the questionnaire. Each respondent was asked to indicate if each value was "opposed to your values", or whether it was "not important", "fairly important" or "very important" as a guiding principle in their life. They were also asked to indicate the value that was most important to them.

The final, tenth, section measured 13 demographic variables including sex, age, occupation, marital status, education level, nature of household, income, postcode, ethnicity and religion.

3.4 SURVEY OF VEGETARIANS

Due to the small number of self-identified vegetarians ($n = 9$) in the random sample, a separate survey using the same questionnaire was conducted with a non-random sample ($n = 106$) of vegetarians and semi-vegetarians.⁴ This was done in order to ensure the sample contained statistically viable numbers for comparisons between people with high meat consumption (present in large numbers in the random sample) and people with very low or nil meat consumption (not present in adequate numbers in the random sample). Participants were selected by placing advertisements in vegetarian cafés and restaurants, health food stores and at the University of Adelaide; by distributing questionnaires at an environmental event; and by word-of-mouth.

3.5 DATA MANAGEMENT AND STATISTICAL ANALYSES

3.5.1 Data entry

Every tenth case was checked for data entry errors. There were four errors found in the 70 cases checked. Given that 200 variables were entered for each case, the error rate was within permissible limits. An additional check on the entered data was performed by ensuring that the preset ranges allowed for the data were not exceeded (e.g. a typical range was from 1 to 5, with "missing" coded as 99).

3.5.2 Statistical methods

The following analyses were conducted with SPSS for Windows statistical software (version 10.0.05, 1999, SPSS Inc.). All statistical tests used an alpha level of 0.05.

⁴ There were 94 vegetarians and 12 semi-vegetarians.

For most of the analyses, the non-randomly selected vegetarian/semi-vegetarian sample was pooled with the randomly selected sample (e.g. the vegetarians from both samples were considered together).

Descriptive statistics

Frequency of participants' responses to the variables was measured. The responses to the questionnaire items for the random population sample alone are shown in Appendix 7. Cross-tabulations by dietary group for the pooled (random and vegetarian) samples were performed, as reported in Chapter 5. Cross-tabulations by sex and dietary group were also performed, with the results displayed in Appendix 10. Cross-tabulations are tables that display the number of cases - and usually percentages also - that fall into each combination of the categories of two or more categorical variables. The Pearson chi-square statistic was used to test the hypothesis that the column and row variables are independent.

The three dietary groups used in the analyses were: self-identified vegetarian, self-identified semi-vegetarian, self-identified non-vegetarian. The data provided by individuals as to whether or not they identified themselves as belonging to a particular dietary group were used, rather than that obtained on frequency of their meat and fish consumption. This was because individual beliefs may be closer to self-definitions than to the "objective" definition of vegetarianism (N. J. Richardson, 1994). In addition, the majority of self-identified vegetarian respondents consumed no meat, fish or seafood and therefore would be classified as vegetarian by using the conventional definition. (See the following chapter, Chapter 4, for further

information on the actual consumption of animal products by members of each self-identified dietary group.)

Principal components analysis

Principal components analyses with varimax rotation⁵ were performed on the responses to the various sections of the questionnaire, namely, use of information sources, trust in information sources, beliefs about meat, barriers to vegetarian diets, benefits of vegetarian diets, and personal values. The results for the pooled (random and vegetarian) samples are reported in Chapter 5. (The results for the random population sample alone are reported in Appendix 8.)

Principal components analysis is a multivariate statistical technique that can be utilised to examine the underlying relationships between a number of variables and to summarise the variables into a smaller set of components or factors (Hair *et al.*, 1995). It determines the minimum number of factors required to account for the maximum part of the variance represented in the original set of variables. In addition, principal components analysis enables data reduction to be achieved by substituting factor scores⁶ for the original variables.

Varimax rotation was used as it is the most commonly utilised exploratory method. It is robust and mathematically precise (since no unique variance is assumed in each item, that is, all item variance is composed of shared variance, unlike true factor

⁵ Varimax is one of the most popular methods of orthogonal factor rotation, which is "factor rotation in which the factors are extracted so that their axes are maintained at 90 degrees" (Hair, Anderson, Tatham, & Black, 1995, pg. 366).

⁶ Factor scores are "composite measures for each factor representing each subject" (Hair *et al.*, 1995, pg. 390).

analysis). Using oblique rotations⁷, as opposed to varimax, is satisfactory but is less precise and an examination of interrelationships between factor scores was not an aim of the thesis.

The tables of principal components analysis results in Chapter 5 and Appendix 8 display the eigenvalue⁸ for each factor, percent of variance accounted for by the factor⁹, and the factor loadings¹⁰. Factor loadings are presented in one-hundredth units. A loading of 35 or more was the criteria used for the significance of factor loadings. (Factor loadings greater than 30 are generally considered to meet the minimal level (Hair *et al.*, 1995).) Internal consistency, based on the average inter-item correlation, was measured for each factor (Cronbach's Alpha).

Multiple regression analysis

Stepwise multiple regression analyses were performed in this study for frequency of meat consumption and a variety of principal components factor scores (or summed scores based on these factors). The dependent variables were examined to ensure their distribution was normal and that Cronbach's Alpha was sufficiently high. They were run with factor scores derived from the principal components analyses, the demographic variables, respondents' recall of promotion of meat and vegetarianism by information sources (some recall or no recall), the four items about general

⁷ Oblique factor rotation is "factor rotation computed so that the extracted factors are correlated. Rather than arbitrarily constraining the factor solution so the factors are independent of one another, the analysis is conducted to express the relationship between the factors that may or may not be orthogonal" (Hair *et al.*, 1995, pg. 366).

⁸ According to Hair (Hair *et al.*, 1995, pg. 365), the eigenvalue is the "column sum of squared loadings for a factor. It represents the amount of variance accounted for by a factor."

⁹ Percent of variance refers to the percent of variance of the correlation matrix (i.e. a table that shows the intercorrelations among all variables) that is accounted for by the factor.

¹⁰ Factor loadings are "the correlation between the original variables and the factors, and the key to understanding the nature of a particular factor" (Hair *et al.*, 1995, pg. 366).

nutrition beliefs and behaviours, and numbers of vegetarian family members and friends.¹¹ The demographic variables used were age, sex, income, education, country of birth (born in Australia or born outside of Australia), number of children aged under 18 years living in the household, marital status, whether they lived alone or not, employment status (employed full-time vs. not employed full-time), religion (having a religion vs. no religion), and ethnic identity (Anglo-Australian vs. other).

Multiple regression analysis is a technique utilised to examine the relationship between a dependent variable and several independent (predictor) variables (Hair *et al.*, 1995). The independent variables have known values and they are used to predict the dependent value that is chosen by the researcher. The stepwise method selects variables to include in the regression model by beginning with the selection of the best predictor of the dependent variable. Further independent variables are selected if their predictive power is statistically significant, and they are ranked by the amount of explanatory power that they can add to the model. Independent variables may be removed if their predictive power becomes non-significant (Hair *et al.*, 1995).

The complete set of variables (as described above) was entered into a multiple regression equation to test which variables influenced the various beliefs and behaviours examined in this study. However, there was a large discrepancy between the number of cases the regression analysis was based on when the alternative

¹¹ The questionnaire did not ask for the number of vegetarian family members that each respondent had (if any), but it did ask for the *type* of family members who were vegetarian ("father", "mother", "sibling/s", "spouse/partner", "children"). Therefore, the number of vegetarian family members that could be measured ranged between 1 and 5. Note that the number of vegetarian family members that a respondent had could be an underestimate in some cases (e.g. if the respondent had more than one sibling who was vegetarian). With regard to the vegetarian friends of respondents, note that it was the *proportion* of vegetarian friends that was measured (e.g. "about a quarter of my friends") rather than the *number* of vegetarian friends.

methods of managing missing cases, excluding cases pairwise¹² or listwise¹³, were used. This was due to the large number of variables in the questionnaire and to the large number used as predictors.¹⁴ The number of cases when listwise was used was approximately half that of the number of survey respondents and resulted in (some) different items entering the equation than when pairwise was used. Therefore, to ensure the results were not methodological artefacts, analyses using both pairwise and listwise methods of managing missing cases were run. The strategy of analysis used was as follows: (1) the complete set of variables was entered into an analysis which excluded cases via the pairwise method; (2) those variables which entered late in the analysis or not at all were disregarded, with a cut-off point of between approximately 1-2% R square; (3) the analysis was re-run with the exclusion of cases via the listwise method; (4) the sample size was checked to ensure that a reasonably high number of respondents was retained in this analysis, with similar items entering the analysis in a similar order to those entering when pairwise exclusion was used; and (5) pairwise

¹² The pairwise method of managing missing values excludes cases from analysis with missing values for either or both of the pair of variables in computing a specific statistic.

¹³ The listwise method of managing missing values excludes cases from analysis that have missing values for any of the variables in any of the analyses.

¹⁴ The number of missing cases for each variable did not appear to be excessive for a questionnaire of this length (200 items) combined with a large number of respondents (707); they ranged between 2 and 94, with only 7 variables having missing cases in excess of 40. These were "recall of the promotion of meat" (94 missing cases), "recall of the promotion of vegetarianism" (88) (explanations may be that (a) neither of these variables were in a prominent position in the questionnaire which may have meant they were not seen, or (b) respondents may have thought these questions were not applicable to them as they did not remember any such promotion), "income" (87; this item is often considered too personal and therefore respondents hesitate to provide such information), "trust in the Internet" (69), "trust in slimming clubs" (44), "trust in teachers/school/higher education" (43) (these respondents may not have used or did not currently use these sources and therefore may have felt that this question was not applicable to them - indeed, 57 "never" used the Internet for food, health or nutrition information, 3 "rarely" used it and 9 did not answer this question; 36 "never" used slimming clubs, 2 "rarely" used them, and 6 did not answer this question; and 29 "never" used teachers/school/higher education, 5 "rarely" used them, 3 used them "sometimes", and 6 did not answer this question), and "My family/spouse/partner won't eat vegetarian food" (41; again, these respondents may have felt this question was not applicable to them, perhaps because they lived alone - indeed, 18 of them lived alone and 5 did not state how many people lived in their household).

exclusion was used for the final results as the number of respondents retained in the analysis was usually slightly higher than for listwise.¹⁵

Regression analyses were conducted within each dietary, sex, and age group. Age groups were formed by splitting respondents' ages into tertiles: 15-37¹⁶, 38 -53, and 54-91 years. The first regression analysis results chapter, Chapter 6, will report the results for age and sex groups (as well as dietary groups), in order to show that demographic differences do exist and to allow some discussion of these issues. However, subsequent chapters will not report results for age and sex groups, although they are presented in Appendix 11. This is because the emphasis of the thesis is on dietary groups rather than demographic groups.

Regression analyses were also conducted for the random population sample alone, the results of which are shown in Appendix 9.

Regression coefficient B (unstandardised)¹⁷, standard error of the coefficient (SE)¹⁸, level of significance (*p*), and R squared (coefficient of determination)¹⁹ are displayed in the multiple regression analysis results tables. R squared is expressed as a percentage.

¹⁵ Note that this method resulted in a lower final R square than when the full pairwise or listwise method was used, as the list of predictors was shortened (i.e. the least important predictors were generally excluded).

¹⁶ Only 13 respondents (1.9% of the pooled samples) were aged 15 to 19 years. As the teenage group was too small to examine separately, adults and teenagers were considered together.

¹⁷ The regression coefficient B is the "numerical value of any parameter estimate directly associated with the independent variables" (Hair *et al.*, 1995, pg. 84).

¹⁸ The standard error is the "measure of the dispersion of the means or mean differences expected due to sampling variation" (Hair *et al.*, 1995, pg. 260). The standard error of the coefficient is the "standard error of the estimate of the regression coefficient" (Hair *et al.*, 1995, pg. 137).

¹⁹ The coefficient of determination, R squared, is the "measure of the proportion of the variance of the dependent variable about its mean that is explained by the independent, or predictor, variables" (Hair *et al.*, 1995, pg. 80).

Tolerance²⁰ and variance inflation factor (VIF)²¹ levels for the predictor variables were examined to ensure collinearity levels were satisfactory. A commonly accepted satisfactory tolerance score is one that is above 0.10, with a corresponding VIF level of below 10 (Hair *et al.*, 1995). All tolerance values exceeded 0.40 in this study.

Stepwise regression, rather than other strategies, was utilised because this is the simplest, most usual method to examine the effects of key variables. Blocks of variables were not examined, as there was no prior reason for using particular blocks of variables. Path analysis²² would give a broad overview but would give no advantage over multiple regression in this pioneering study since there was no clear a priori model to test.

Categorical principal components analysis

The final statistical technique utilised was categorical principal components analysis (CATPCA). CATPCA was performed on the combined responses to beliefs about meat and barriers and benefits of vegetarian diets. This was done in order to identify those non-vegetarian individuals who fell into the same range as the vegetarians for the combined meat beliefs and barriers and benefits of vegetarianism.

²⁰ Tolerance is a "commonly used measure of collinearity and multicollinearity, the tolerance of variable i (TOL_i) is $1 - R^{2*}_i$, where R^{2*}_i is the coefficient of determination for the prediction of variable i by the other predictor variables. As the tolerance value grows smaller, the variable is more highly predicted (collinear) with the other predictor variables" (Hair *et al.*, 1995, pg. 85).

²¹ The VIF is the "indicator of the effect that the other predictor variables have on the variance of a regression coefficient, directly related to the tolerance value ($VIF_i = 1/R^{2*}_i$)" (Hair *et al.*, 1995, pg. 85).

²² Path analysis is a technique "employing simple bivariate correlations to estimate the relationships in a system of structural equations. The method is based on specifying the relationships in a series of regressionlike equations (portrayed graphically in a path diagram) that can then be estimated by determining the amount of correlation attributable to each effect in each equation simultaneously" (Hair *et al.*, 1995, pg. 620-621).

CATPCA is a multivariate statistical technique that quantifies categorical variables. CATPCA also reduces the dimensionality of the data, like principal components analysis does (SPSS, 1990). However, non-linear analysis can be performed by CATPCA, but not by standard principal components analysis (SPSS, 1990).

Chapter 4

RESPONSE AND RESPONDENT CHARACTERISTICS

4.1 RESPONSE

Of the randomly selected subjects who could be contacted, 70.6% filled out the questionnaire ($n = 603$), with two questionnaires being unusable.¹ Approximately 15% ($n = 146$) of the sample could not be contacted because their addresses were incomplete or had changed since the Marketing Pro data were collected, or they were unable to be contacted by telephone. There were 106 non-randomly selected vegetarian and semi-vegetarian participants, yielding a total of 707 usable questionnaires.

4.2 SAMPLE DISTRIBUTION AND POTENTIAL BIAS IN THE SURVEY

The particular methodology used in a survey may generate bias (e.g. Babbie, 1989; Schwarz, 1999). In addition, respondents who choose to participate in a survey may differ somewhat from the general population, and this may introduce bias into the survey. For example, it may only be people who are interested in the survey topic who participate. Alternatively, there may be other reasons for participation or lack of participation, such as not having enough time due to family or work obligations, which result in respondents differing to non-respondents. However, a high response

¹ The response rate increased to 72.4% when very ill people (who were also mainly elderly) were excluded, and 74.2% when people with major difficulties with the English language were also excluded.

rate, such as was obtained in this survey, ensures that the risk of bias is diminished (Babbie, 1989).

Table 4.1 lists some of the demographic characteristics of the non-randomly selected sample (mostly vegetarians), the randomly selected (mostly omnivores) sample, and the general South Australian population, as obtained from the Basic Community Profile of the 1996 Census of Population and Housing (Australian Bureau of Statistics, 1996). Comparisons were made between the samples and the Census data for sex, age, country of birth, employment status, marital status, and religion, as these were the variables in the Basic Community Profile that were directly comparable to the demographic variables in the survey. There were some differences between the groups. The main biases in the randomly selected sample were under-representation of 19-24 year olds and over-representation of 45-64 year olds, married people and members of the Uniting Church, compared with the Census data (Table 4.1).

The non-random group was younger than the random and Census groups (Table 4.1). This is in accordance with findings from surveys that the prevalence of vegetarianism is higher amongst younger people (Australian Bureau of Statistics, 1997; Vegetarian Society UK, n.d.; Worsley & Skrzypiec, 1997). Compared with the random sample and the Census data, fewer of the non-random sample were employed full-time, married or widowed/divorced, or had a religion, although more were Jewish or Buddhist (Table 4.1).² Similarly, early non-random studies of vegetarians and non-

² Note that these and other differences between the randomly and non-randomly selected samples were not due to the younger age of the vegetarian sample. Younger people (44 years and under) from the random and non-random samples were compared with each other for beliefs and demographic characteristics such as religion and marital status; statistically significant differences were still found to be present. Thus, these differences appear to be related to vegetarian status rather than age.

vegetarians found that more vegetarians stated that they had no religion (Freeland-Graves, Greninger, & Young, 1986; Sims, 1978). Unemployment figures were similar for the non-random sample and the Census data. However, the random sample contained a lower proportion of unemployed people.

Education and level of income were compared between the random and non-random samples, although there were no directly comparable data for these items in the Basic Community Profile. The non-random sample was more highly educated than the random sample ($p < 0.001$). However, their level of income was lower ($p < 0.05$) (Table 4.1).³

Of note is the lack of difference in the proportion of men and women between the random and non-randomly selected samples. As discussed in Chapter 1, generally more women are vegetarian than men, and the 1995 National Nutrition Survey found this to be the case for South Australians (Australian Bureau of Statistics, 1995). However, the vegetarian/semi-vegetarian group was not randomly selected, which possibly explains this. Nonetheless, there were also no statistically significant sex differences in the prevalence of vegetarianism and semi-vegetarianism in the random population sample: 1.5% of females and 1.6% of males identified as vegetarian, while 7.7% of females and 6.7% of males identified as semi-vegetarian. However, there were more females than males in all of the dietary groups. Of the non-vegetarians, 56.7% were female, while 61.8% and 53.4% of the semi-vegetarians and vegetarians respectively were female.

³ See the final note for Table 4.1 for a possible partial explanation for why income was lower among the non-random sample.

TABLE 4.1
The demographic characteristics of the random population survey respondents (*n* = 601), the non-randomly selected vegetarian and semi-vegetarian sample (*n* = 106), and, where applicable, the South Australian population as a whole, as obtained from the 1996 Census

	Non-random survey respondents (%)	Random survey respondents (%)	1996 census [†] (%)
Sex			
Female	54.7	56.8	51.4
Male	45.3	43.2	48.6
Age*			
15-18 years	3.8	0.7	6.7
19-24 years	27.4	3.8	10.5
25-44 years	48.1	40.9	38.0
45-64 years	17.0	33.4	26.9
65+ years	3.8	21.2	17.4
Country of birth			
Australia	71.4	74.2	75.5
Other country	28.6	25.8	24.5
Employment status[‡]			
Employed full-time	17.9	29.8	34.2
Employed part-time	17.9	17.6	17.1
Unemployed	7.5	1.7	6.1
Marital status			
Married ^{††}	38.5	69.0	54.0
Widowed/divorced	10.6	17.4	17.2
Religion			
No religion	54.3	22.6	21.8
Uniting Church	0	22.6	12.7
Catholic	3.8	20.1	20.7
Anglican	1.0	15.5	16.0
Seventh-day Adventist	0	0.7	0.002
Buddhist	6.7	0.5	0.01
Jewish	2.9	0.2	0.001
Highest education level			
Primary school	0	6.3	
Some high school	4.7	15.8	
High school	16.0	35.7	
Technical/trade certificate	3.8	12.1	
University/tertiary qualification	75.5	30.1	
Household income (p.a.)[#]			
≤\$10,000	26.0	14.3	
\$10,001 - \$30,000	34.4	32.4	
\$30,001 - \$50,000	17.7	23.5	
\$50,001 - \$80,000	14.6	18.5	
≥\$80,001	7.3	11.3	

[†]Note that Census data could only be included in this table where Census items were directly comparable to questionnaire items.

*No minimum age prerequisite was specified for participation in the survey, but as the survey was addressed to a person listed in the phone directory (random sample) or advertised at university, restaurants and the like (non-random sample), it was expected that younger people (particularly under-18s) would be less likely to participate. As no-one under 15 participated in the survey, the Census data for age excludes those under 15 (i.e. the percentages are expressed as a percent of those aged 15 and over). The Census percentages do not total 100% due to the inclusion of overseas visitors (with no age stated) in the total number of persons.

[‡]The survey percentages for "employed full-time" and "employed part-time" exclude those self-employed, as there was a separate category for the latter, comprising 7.3% of the random sample and 11.3% of the non-random sample. However, the Census data included the self-employed with full-time or part-time employed. Therefore, the survey "employed full-time" and "employed part-time" categories are an underestimate. Also note that in both the Census and the questionnaire "unemployed" does not include students and those not looking for work, such as retired people.

^{††}In the survey, "married" includes "living together", whereas in the Census, it does not. Therefore, the survey figure is an overestimate.

[#]Note that a proviso was made in the questionnaire that if living in a group (share) house, this figure should be the respondent's own income (as, generally, income is not pooled in such living situations). Therefore, it is probable that, as young people formed a larger proportion of the non-random sample than the random sample, the figures for the non-random sample in particular may partly be a reflection of personal, rather than household, income.

It must be noted that caution should be exercised when comparing a sample that has been randomly selected with a sample that has not been randomly selected. Given the rarity of vegetarians and the time and financial limitations of the research project, it was not possible to select a random sample of vegetarians (see pages 253-254, Chapter 13, for further discussion of this issue). However, it appears that although there were differences present between the randomly and non-randomly selected samples with regard to some variables, the two samples were moderately similar overall. Furthermore, checks were made for possible confounders that could be alternative explanations of differences between vegetarians and non-vegetarians, such as that noted in Footnote 2 above.

The vegetarians selected by the non-random method were compared to the small group ($n = 9$) of vegetarians who were selected randomly. Analysis of variance⁴ was performed on the factor scores, demographic and other variables for both groups. The only variable to achieve a statistically significant difference between the groups was recall of the promotion of vegetarianism ($p < 0.01$), with the non-randomly selected vegetarians having a higher mean, and thus having higher recall of this information. Thus, it appears that the overall characteristics of the vegetarian groups were similar; the differing methods of selection of vegetarian participants introduced little bias into the sample. However, there were major problems with power limitations in this analysis due to the low number of randomly selected vegetarians.

⁴ Analysis of variance (ANOVA) is a statistical technique used to establish if samples originate from populations with equal means (Hair *et al.*, 1995).

4.3 ACTUAL CONSUMPTION OF ANIMAL PRODUCTS BY SELF-IDENTIFIED DIETARY GROUP

4.3.1 Random population sample

There were nine self-identified vegetarians in the random population sample, which was 1.5% of the sample. As frequency of meat and fish consumption were also measured, it was possible to examine the relation between self-perception and actual behaviour. None of the nine self-identified vegetarians reported that they consumed red meat. However, two occasionally ("rarely") consumed white meat and also, more frequently, fish. In addition, one other self-identified vegetarian did not record whether or not they ate fish, but they never ate red or white meat. Assuming that they also did not eat fish, 77.8% of self-identified vegetarians would be classified as vegetarian by using the conventional definition (66.7% if the respondent did eat fish).

There were 43 self-identified semi-vegetarians in the randomly selected sample (7.2% of respondents). This group ate red and white meat less frequently than non-vegetarians. Red meat was reported to be eaten less than once a week by 67.4% of self-identified semi-vegetarians, compared with 19.5% of non-vegetarians, while none ate it daily, compared to 11.6% of non-vegetarians (see Table 4.2 for the frequency of meat consumption for non-vegetarians). White meat was eaten less than once a week by 40.5% of semi-vegetarians, compared with 19.7% of non-vegetarians. With regard to fish and seafood, frequency of consumption was comparable between semi-vegetarians and non-vegetarians (for example, 58.6% of semi-vegetarians and 55.0% of non-vegetarians ate fish and/or seafood less than once a week).⁵

⁵ See Table 8 in Appendix 7 for the frequency of consumption of red and white meat, fish and seafood, dairy and eggs for the random population sample considered as a group.

4.3.2 Pooled random population and vegetarian samples

There were 546 self-identified non-vegetarians, 55 self-identified semi-vegetarians, and 103 self-identified vegetarians in the pooled samples (randomly selected together with non-randomly selected).

The majority of self-identified vegetarians in this study stated that they never eat red or white meat, fish or seafood (84.5%) and therefore may be defined as actually vegetarian.⁶

Table 4.2 shows the percentage of each self-identified dietary group who consumed each kind of food at various frequencies. About half of the self-identified semi-vegetarians never or rarely ate red meat (compared to less than 4% of self-identified non-vegetarians). Just over a quarter of self-identified semi-vegetarians never or rarely ate white meat (3% of non-vegetarians). Similar proportions of self-identified semi-vegetarians and non-vegetarians never or rarely ate fish or seafood (13.2% and 15.3% respectively). Thus, of the three kinds of animal products, semi-vegetarians were most likely to avoid red meat, with fewer avoiding white meat. They were no more likely to avoid (rarely or never consume) fish or seafood than non-vegetarians.

⁶ There were no vegans in the randomly selected sample, although there was a lacto-vegetarian who only ate dairy "rarely" (less than once a month), and a lacto-ovo-vegetarian who only "rarely" ate dairy and eggs. There were 28 vegans in the non-randomly selected sample of vegetarians and semi-vegetarians (i.e. 26% of the non-random sample). The vegan sample was too small to analyse separately.

TABLE 4.2
The percentage of self-identified vegetarians, semi-vegetarians and non-vegetarians who stated that they consume red meat, white meat and fish/seafood at various frequencies

	Vegetarian (self-identified, %)	Semi-vegetarian (self-identified, %)	Non-vegetarian (self-identified, %)
Red meat			
Never	97.1	20.0	0.2
Rarely	2.9	29.1	3.7
1-3 times per month	0	23.6	15.6
1-4 times per week	0	27.3	69.0
Daily or almost daily	0	0	11.6
White meat			
Never	95.1	11.1	0.4
Rarely	4.9	14.8	2.6
1-3 times per month	0	25.9	16.7
1-4 times per week	0	42.6	75.6
Daily or almost daily	0	5.6	4.8
Fish and seafood			
Never	85.3	1.9	1.7
Rarely	8.8	11.3	13.6
1-3 times per month	4.9	47.2	39.7
1-4 times per week	1.0	37.7	43.8
Daily or almost daily	0	1.9	1.1

For these items, vegetarian *n* ranged between 102 and 103, semi-vegetarian *n* ranged between 53 and 55, and non-vegetarian *n* ranged between 536 and 545.

Analyses in this thesis focus on dietary groups, as discussed in the previous chapter. It was decided to form these dietary groups according to respondents' self-reports of dietary behaviour. As mentioned in Chapter 3, self-identification as a vegetarian, semi-vegetarian or non-vegetarian may be a better indicator of beliefs than actual behaviour. There were no definitions of these categories provided in order for respondents' own perceptions of which category they belonged in to be taken into account. In these samples, self-reports of dietary behaviour appear to approximate actual behaviour and therefore provide further justification for their use in the analyses reported in this thesis.

Chapter 5

FACTORS AND FREQUENCIES: COMPARISONS BETWEEN BELIEFS OF VEGETARIANS, NON- VEGETARIANS, AND SEMI-VEGETARIANS

5.1 INTRODUCTION

As previously discussed, beliefs, benefits, barriers to change, and personal values are important components of food choice. Beliefs and values are often held in conjunction with other similar beliefs and values. Similarly, it may be expected that certain information sources group together. This chapter will describe the factors derived from the questionnaire (use of and trust in food, health and nutrition information sources, beliefs about meat, perceived barriers to, and benefits of, vegetarianism, and personal values) for the pooled random and non-randomly selected samples, identified via principal components analysis.

Vegetarians have been shown to have different levels of use of and trust in certain information sources, beliefs, and personal values to non-vegetarians (see Chapter 1). This chapter will therefore examine the differences and similarities between the responses of self-identified non-vegetarians, semi-vegetarians and vegetarians to the main sections of the questionnaire (above), including their general nutritional beliefs and behaviours (aim 1; Chapter 2). Any statistically significant differences will be identified. Thus, this chapter will introduce the most basic survey results. In addition to the quantitative results, the results of the interviews with vegetarians will be presented via a series of vignettes throughout this chapter. These will serve to add a more detailed qualitative element to the quantitative findings.

It was hypothesised (hypothesis 1; Chapter 2) that vegetarians would be less likely than non-vegetarians to hold positive beliefs about meat and to believe that there are barriers to eating a vegetarian diet, to use and trust orthodox sources, mass media and advertising, and to hold values related to "power" and "tradition" in high regard. Conversely, it was predicted that vegetarians would be more likely than non-vegetarians to believe that there are benefits involved with eating a vegetarian diet, to use and trust unorthodox sources, and to hold personal values associated with equality and the environment ("universal" values). Semi-vegetarians were expected to be intermediate between vegetarians and non-vegetarians in their responses.

5.2 METHOD

Principal components analyses were performed on the responses of the pooled samples to the following sections of the questionnaire: use of information sources, trust in information sources, beliefs about meat, barriers to vegetarian diets, benefits of vegetarian diets, and personal values. Cross-tabulations by dietary status (i.e. vegetarian, semi-vegetarian, non-vegetarian) were performed for the pooled samples for responses to the items in these sections of the questionnaire, and also for the four general nutrition beliefs and behaviour items.

For a synopsis of the interview method, please refer to sections 3.1 and 3.2 in Chapter 3 (pages 55-58).

5.3 USE OF INFORMATION SOURCES

5.3.1 Results

Six components (factors) with eigenvalues greater than one were derived, accounting for 57.7% of the correlation matrix variance. The components are listed in Table 5.1. *Use Unorthodox Sources* (Factor 1; Table 5.1) dominated the results (24.1% of variance) with the remaining factors accounting for less than eleven percent of the total variance (see Table 5.1). It consisted of the following sources: alternative health practitioners, vegetarian and health magazine articles and health food shops/staff, as well as books and the Internet. *Use Mass Media and Advertising* (Factor 2) was dominated by television and advertising. The remaining factors were *Use Social Sources* (Factor 3), *Use Orthodox Sources* (Factor 4) and *Use Specialised Media A* (Factor 5) and *B* (Factor 6).¹

Measures of internal reliability (Cronbach's Alpha) indicated that all of the factors had high or moderate internal consistency (Table 5.1).

There were strong differences between non-vegetarians, semi-vegetarians and vegetarians in their frequency of use of many of the information sources, particularly unorthodox sources (which vegetarians used more often), television, advertising, orthodox sources (all of which non-vegetarians used more often), and some specialised media sources (Table 5.1). For example, 43-44% of semi-vegetarians and vegetarians used alternative health practitioners for food, nutrition and health information at least sometimes, compared to 20% of non-vegetarians, while television

¹ See Appendix 8 for the results of principal components analysis of the random sample only, for this and the remaining sections of the questionnaire that are examined in this chapter.

programs were used by about a third of vegetarians, compared with almost two-thirds of non-vegetarians. Semi-vegetarians tended to be intermediate between non-vegetarians and vegetarians in their frequency of use of the information sources. Dietitians and nutritionists were used by similar proportions of the dietary groups (about a third), as were newspapers and radio programs.²

TABLE 5.1
Results of principal components analysis, and cross-tabulations analysis by dietary group, of use of food, health and nutrition information sources

FACTOR & ITEMS	Factor loading	Non-veg. % Use	Semi-veg. Sometimes	Vegetarian or Often	p
Factor 1: Use unorthodox sources					
Eigenvalue: 5.54					
Cronbach Alpha: 0.75 (0.76 if last item omitted)					
Percent of Variance: 24.1%					
Alternative health practitioners	70	20	43	44	***
Articles in vegetarian magazines	68	13	55	78	***
Health food shops/staff	67	26	42	45	***
Books	60	60	78	85	***
Articles in health magazines	58	43	60	68	***
Internet	52	5	12	30	***
Factor 2: Use mass media and advertising					
Eigenvalue: 2.45					
Cronbach Alpha: 0.77					
Percent of Variance: 10.7%					
Television programs	82	62	57	36	***
Advertising	76	61	46	28	***
Newspaper articles	66	60	59	49	NS
Radio programs	66	39	47	31	NS
Articles in women's magazines	37	42	40	23	**
Factor 3: Use social sources					
Eigenvalue: 1.55					
Cronbach Alpha: 0.74					
Percent of Variance: 6.8%					
Friends	82	61	71	64	NS
Family	78	69	69	40	***
Work-mates	68	34	43	24	*
Teachers/school/higher education	48	18	29	22	NS

[over]

² Note that, as the results of the cross-tabulation analyses for the pooled samples by dietary group and sex (Appendix 10) show, these differences and similarities between vegetarians, non-vegetarians and

TABLE 5.1 [continued]

FACTOR & ITEMS	Factor loading	Non-veg. % Use	Semi-veg. Sometimes	Vegetarian or Often	<i>p</i>
Factor 4: Use orthodox sources					
Eigenvalue: 1.41					
Cronbach Alpha: 0.63					
Percent of Variance: 6.1%					
Doctors (medical)	75	47	26	23	***
National Heart F'dn/Anti-Cancer F'dn	70	42	47	21	***
Dietitians/Nutritionists	65	33	37	28	NS
Factor 5: Use specialised media A					
Eigenvalue: 1.23					
Cronbach Alpha: 0.58 (0.71 if last item omitted)					
Percent of Variance: 5.3%					
Articles in cooking magazines	73	58	60	43	*
Articles in women's magazines	71	42	40	23	**
Articles in health magazines	44	43	60	68	***
Internet	-39	5	12	30	***
Factor 6: Use specialised media B					
Eigenvalue: 1.08					
Cronbach Alpha: 0.57					
Percent of Variance: 4.7%					
Articles in sports magazines	72	13	20	11	NS
Articles in science magazines	64	17	33	35	***
Teachers/school/higher education	50	18	29	22	NS

For this and the following tables, analyses were based on the following (maximum possible) group sizes: non-vegetarian $n = 546$, semi-vegetarian $n = 55$, vegetarian $n = 103$ (respondents identified their own dietary status).

Factor loadings are in one-hundredth units and the factor loadings and explained variances are based on the rotated solution.

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Note that "Slimming clubs" and "Food labels" did not load on to a factor. The former were used at least sometimes by 9%, 10% and 2% of non-vegetarians, semi-vegetarians and vegetarians respectively ($p < 0.05$), while food labels were used by 81%, 83% and 83% respectively (NS).

The main sources used at least sometimes ("sometimes" or "often") to find food, nutrition and health information by the three dietary groups are listed in Table 5.2.³ Food labels were the source most highly utilised by non-vegetarians. Semi-vegetarians and vegetarians also utilised food labels frequently, with this source ranking first for the former group and second for the latter. Books were the source used most frequently by vegetarians (Table 5.2).

semi-vegetarians tended to (but not always) remain for within-sex analyses. This was also true for the subsequent analyses in this chapter.

³ Note that these rankings are ordered by combined use "sometimes" and "often", rather than primarily by use "often" and secondly by use "sometimes". Similarly, all subsequent rankings are ordered by

TABLE 5.2
The five most highly used sources of food, health and nutrition information for each dietary group (non-vegetarians, semi-vegetarians, vegetarians)

Most highly used sources of food, health and nutrition information[†]	%
Non-vegetarians	
Food labels	81
Family	69
Television programs	62
Advertising*	61
Friends*	61
Semi-vegetarians	
Food labels	83
Books	78
Friends	71
Family	69
Articles in health magazines [‡]	60
Vegetarians	
Books	85
Food labels	83
Articles in vegetarian magazines	78
Articles in health magazines	68
Friends	64

[†]"sometimes" and "often" use

* 61.0% used advertising and 60.5% used friends at least sometimes as a source of food, health or nutrition information

[‡] Cooking magazines were used at an approximately equal frequency to health magazines; 60.4% of semi-vegetarian respondents "sometimes" or "often" used health magazines, while 60.3% "sometimes" or "often" used cooking magazines.

5.3.2 Discussion

The finding that vegetarians use unorthodox sources more often than orthodox sources, while the reverse is true for non-vegetarians, is aligned with the findings of previous research that suggested that patients of alternative health practitioners were more likely to be vegetarians than patients of general practitioners (e.g. Furnham & Forey, 1994 and see page 16, Chapter 1). Of note is the use of dietitians and nutritionists by similar proportions of the dietary groups; dietitians may be considered an orthodox source, yet vegetarians use them approximately as often as non-vegetarians.

combined "strongly agree" and "agree" (or "trust totally" and "trust") rather than primarily by "strongly agree" and then by "agree" (or "trust totally" and then by "trust").

Food labels may need to be utilised more often by health professionals who wish to promote plant-based diets (or, conversely, meat), being highly used by non-vegetarians. Food labels on meat have been previously identified as an important source of meat-related information, being more highly used than any other source for non-vegetarians and moderately trusted (N. J. Richardson, Shepherd *et al.*, 1994). Food labels are also highly used by vegetarians and semi-vegetarians. They may use them for different reasons to non-vegetarians though, such as by examining the ingredient list for the presence of animal products. More research needs to be conducted on exactly which part of food labels (ingredient list, nutrition table, description of the food etc.) are used by non-vegetarians, vegetarians and semi-vegetarians.

The media may also need to be utilised more frequently by promoters of plant-based diets. Television and advertising may be particularly important, as they are used by about 60% of non-vegetarians for food, health and nutrition information. The media is already highly utilised by the meat industry, although it is unknown what impact this has on the meat consumption of Australians.

5.4 TRUST IN INFORMATION SOURCES

5.4.1 Results

Six components with eigenvalues greater than unity were derived, with 65% of the correlation matrix accounted for. One component dominated the results, accounting for 33% of variance - *Trust Advertising and Mass Media*. The remaining five factors each accounted for less than nine percent of the total variance (Table 5.3).

Advertising and television programs dominated *Trust Advertising and Mass Media* (Factor 1; Table 5.3), while friends and family had the strongest loadings on *Trust Social Sources* (Factor 2). Trust in vegetarian magazines, health food shops/staff and alternative health practitioners were most important in *Trust Unorthodox Sources* (Factor 3). *Trust Orthodox Sources* (Factor 4) was dominated by trust in the National Heart Foundation, Anti-Cancer Foundation and doctors, while science magazines and books were important in *Trust Specialised Media* (Factor 5). The final factor, *Trust Food Labels and Internet* (Factor 6) also included books, teachers and school/higher education.

All of the factors had high or moderate internal consistency (Table 5.3).

As for frequency of use of information sources, there were clear differences between vegetarians, semi-vegetarians and non-vegetarians in their level of trust in these sources (Table 5.3). Indeed, level of trust was significantly different for all of the sources apart from four (articles in science magazines, books, friends and food labels). Vegetarians were less trustful of advertising and mass media, family, work-mates and orthodox health sources (e.g. doctors and dietitians) compared to non-vegetarians. However, they were more trustful of sources such as vegetarian magazines and health food shops/staff.

Non-vegetarians trusted orthodox sources more than the other sources, as shown in Table 5.4, which lists the five most highly trusted ("trust" and "trust totally") sources of food, health and nutrition information. The National Heart and Anti-Cancer Foundations and medical doctors were the most strongly trusted. Semi-vegetarians trusted similar sources to non-vegetarians; orthodox sources were the most highly

trusted. In contrast, vegetarians trusted relatively unorthodox sources, such as vegetarian and health magazines, more than the other sources (Table 5.4).

TABLE 5.3
Results of principal components analysis, and cross-tabulations analysis by dietary group, of trust in food, health and nutrition information sources

FACTOR & ITEMS	Factor loading	Non-veg. % Trust (% <i>Unsure</i>)	Semi-veg. % Trust (% <i>Unsure</i>)	Vegetarian % Trust (% <i>Unsure</i>)	<i>p</i>
Factor 1: Trust advertising and mass media					
Eigenvalue: 7.58					
Cronbach Alpha: 0.87					
Percent of Variance: 33.0%					
Advertising	81	20 (41)	15 (19)	4 (12)	***
Television programs	79	34 (42)	28 (37)	12 (32)	***
Articles in women's magazines	72	27 (50)	29 (45)	12 (33)	***
Radio programs	63	28 (52)	26 (55)	16 (51)	*
Newspaper articles	55	31 (52)	29 (52)	15 (43)	***
Articles in sports magazines	52	18 (64)	19 (48)	12 (48)	***
Articles in cooking magazines	52	52 (41)	64 (30)	31 (48)	***
Slimming clubs	46	14 (53)	10 (44)	4 (27)	***
Articles in health magazines	35	51 (42)	68 (26)	62 (29)	*
Factor 2: Trust social sources					
Eigenvalue: 1.92					
Cronbach Alpha: 0.82					
Percent of Variance: 8.3%					
Friends	87	41 (51)	49 (45)	39 (51)	NS
Family	83	56 (38)	62 (32)	32 (52)	***
Work-mates	71	19 (65)	31 (53)	13 (53)	***
Teachers/school/higher education	52	25 (64)	27 (63)	23 (54)	*
Factor 3: Trust unorthodox sources					
Eigenvalue: 1.79					
Cronbach Alpha: 0.77					
Percent of Variance: 7.8%					
Articles in vegetarian magazines	72	26 (62)	63 (37)	81 (16)	***
Health food shops/staff	69	33 (51)	44 (46)	50 (41)	**
Alternative health practitioners	67	37 (51)	54 (40)	49 (44)	*
Articles in health magazines	64	51 (42)	68 (26)	62 (29)	*
Articles in cooking magazines	42	52 (41)	64 (30)	31 (48)	***
Factor 4: Trust orthodox sources					
Eigenvalue: 1.50					
Cronbach Alpha: 0.77 (0.78 if last item omitted)					
Percent of Variance: 6.5%					
National Heart F'dn/Anti-Cancer F'dn	82	83 (16)	81 (17)	50 (31)	***
Doctors (medical)	78	83 (15)	71 (20)	34 (27)	***
Dietitians/Nutritionists	70	71 (26)	71 (23)	49 (41)	***
Teachers/school/higher education	37	25 (64)	27 (63)	23 (54)	*

[over]

TABLE 5.3 [continued]

FACTOR & ITEMS	Factor loading	Non-veg. % Trust (% Unsure)	Semi-veg. % Trust (% Unsure)	Vegetarian % Trust (% Unsure)	p
Factor 5: Trust specialised media					
Eigenvalue: 1.13					
Cronbach Alpha: 0.73					
Percent of Variance: 4.9%					
Articles in science magazines	73	37 (53)	44 (46)	40 (44)	NS
Books	54	46 (48)	52 (40)	58 (40)	NS
Articles in vegetarian magazines	40	26 (62)	63 (37)	81 (16)	***
Articles in health magazines	38	51 (42)	68 (26)	62 (29)	*
Radio programs	38	28 (52)	26 (55)	16 (51)	*
Factor 6: Trust food labels and internet					
Eigenvalue: 1.03					
Cronbach Alpha: 0.59					
Percent of Variance: 4.5%					
Food labels	67	43 (35)	39 (28)	34 (43)	NS
Internet	59	4 (68)	7 (66)	12 (67)	*
Books	37	46 (48)	52 (40)	58 (40)	NS
Teachers/school/higher education	35	25 (64)	27 (63)	23 (54)	*

Factor loadings are in one-hundredth units and the factor loadings and explained variances are based on the rotated solution.

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

TABLE 5.4

The five most highly trusted sources of food, health and nutrition information for each dietary group (non-vegetarians, semi-vegetarians, vegetarians)

Most highly trusted sources of food, health and nutrition information [†]	%
Non-vegetarians	
National Heart Foundation/Anti-Cancer Foundation*	83
Doctors (medical)*	83
Dietitians/Nutritionists	71
Family	56
Articles in cooking magazines	52
Semi-vegetarians	
National Heart Foundation/Anti-Cancer Foundation	81
Dietitians/Nutritionists [‡]	71
Doctors (medical) [‡]	71
Articles in health magazines	68
Articles in cooking magazines	64
Vegetarians	
Articles in vegetarian magazines	81
Articles in health magazines	62
Books	58
Health food shops/staff ^{††}	50
National Heart Foundation/Anti-Cancer Foundation ^{††}	50

[†]"trust totally" and "trust"

* 83.2% trusted the National Heart and Anti-Cancer Foundations, while 82.6% trusted doctors

[‡] 71.2% trusted dietitians/nutritionists, while 70.6% trusted doctors

^{††} 50.0% trusted health food shops/staff, while 49.5% trusted the National Heart and Anti -Cancer Foundations

VEGETARIAN PERSPECTIVE Trust in information sources

The questioning by vegetarians of some mainstream behaviours, including the norm of eating meat, may extend to a scepticism of mainstream nutritional and health information sources. The world-views of vegetarians often lead them to reject the mainstream media as sources of valid information, such as with regard to health and nutrition information, and to search for different information. Interviewees pointed out how it is necessary to have a sense of inquiry and choose which information to accept, and which to discard.

I don't wholly trust any of them [information sources]. I think everybody has a reason for telling you something, and for usually self-interest reasons. I think if you approach the information they give you with that in mind, you've got a good chance of filtering out the bad stuff and keeping more of the good stuff.

Female, aged 25 (vegan)

Information from sources seen as having a vested interest, like Meat and Livestock Australia and the Dairy Corporation, was treated with suspicion and generally disregarded.

That women and iron ad [promoting meat consumption for women] - I really objected to that ad...As a piece of cultural phenomena it was interesting, but I don't for a number of reasons believe the, in inverted commas, "information" that they're giving me, partly because they [have] a vested interest.

Female, aged 34 (lacto-ovo-vegetarian)

The Anti-Cancer Foundation and National Heart Foundation were also looked upon unfavourably by some interviewees.

I think they're quite ineffective actually. I think they're self-perpetuating money pits. People throw money at them and they still encourage people to take part in something that's unnecessary and bad for their health, therefore there's a need to throw more money at them. We're not into preventative medicine or health in Australia. If they were to go on a good nutritional diet, which is a vegetarian one, there wouldn't be so much need for these foundations and hospitals and everything. I don't trust those.

Female, aged 39 (usually vegan)

[over]

VEGETARIAN PERSPECTIVE Trust in information sources [continued]

There was concern felt over the information provided by health professionals. Doctors were seen to have inadequate nutritional knowledge. As one interviewee expressed it:

Most physicians don't have any idea what they're talking about, dietarily. And why should they? They do - I don't know what it is now, but they used to do six weeks on diet in their whole course, so I don't see why anybody should even expect them to. It's like asking the plumber about an electrical matter.

Female, aged 50 (semi-vegetarian)

Dietitians were also occasionally singled out:

Dietitians. A lot of them absolutely horrify me. They make it seem like it's OK to eat hospital food for example. So how does anybody ever make it out of hospital?

Female, aged 50 (semi-vegetarian)

5.4.2 Discussion

Higher trust in unorthodox than orthodox sources of general food, nutrition and health information among vegetarians, and the reverse for non-vegetarians, has not been clearly observed among vegetarians until now, to the candidate's knowledge. However, differences in use have been shown, as discussed above, and it was therefore thought likely to be the case. In addition, the interviews conducted with vegetarians suggested mistrust of the mass media. This quantitative study confirmed these findings. It also extended such findings by examining trust in a broader selection of information sources and finding significant differences between dietary groups for the majority of sources (such as the Internet, cooking magazines, and radio programs).

Doctors were found to be highly trusted by non-vegetarians and semi-vegetarians (indeed, more so than dietitians and nutritionists for non-vegetarians) despite their well-documented lack of nutrition knowledge (Chitwood, McIntosh, & Kubena, 1994-

95; Helman, 1997; Lazarus, 1997). General practitioners are interested in learning more about nutrition however (Hiddink, Hautvast, van Woerkum, Fieren, & van't Hof, 1995). Orthodox sources are as suitably placed to promote plant-based diets, as they are to promote meat. Future research could examine the information about meat and vegetarianism provided by orthodox sources.

Of interest is the different level of use and trust for particular items. That is, the importance of items as a source of food, health or nutrition information as measured by (a) frequency of use and (b) level of trust did not necessarily correspond. For example, food labels were used at least sometimes by over 80% of all dietary groups, but were trusted by fewer than 45% of members of each group. In contrast, orthodox sources such as the National Heart and Anti-Cancer Foundations were highly trusted by non-vegetarians and semi-vegetarians but were used sometimes or often as a source of food, health or nutrition information by less than 50% of these respondents. This has been noted previously (e.g. N. J. Richardson, Shepherd *et al.*, 1994). This finding implies that factors other than trust are associated with frequency of use of a particular source. For example, convenience or cost may also play a role in the choice of an information source.

5.5 GENERAL NUTRITION BELIEFS AND BEHAVIOURS

5.5.1 Results

Principal components analysis could not be conducted on the general nutrition beliefs and behaviours, as the number of items (four) was too low.

There were no significant differences between dietary groups for two items ("Diet is important in preventing illness and disease" and "I do not need to make any changes to the food I eat as it is already healthy enough"), while there were strong differences for the remaining two items (see Table 5.5). Non-vegetarians were least likely to think about the nutritional aspects of the food that they eat, while 60% looked for information on healthy eating compared to 77% of semi-vegetarians and vegetarians.

TABLE 5.5
Results of cross-tabulations analysis by dietary group of general nutrition beliefs and behaviours

ITEM	Non-veg.	Semi-veg.	Vegetarian	<i>p</i>
	% Agree (% Unsure)			
Diet is important in preventing illness and disease	93 (4)	94 (2)	99 (0)	NS
I do not need to make any changes to the food I eat as it is already healthy enough	44 (18)	42 (17)	58 (16)	NS
I usually do not think about the nutritional aspects of the types of food that I eat	32 (8)	15 (2)	8 (6)	***
I frequently look for information on healthy eating	60 (15)	77 (9)	77 (11)	**

*** $p < 0.001$, ** $p < 0.01$

5.5.2 Discussion

It is encouraging that over 90% of all three dietary groups believed in the importance of diet in the prevention of illness and disease. However, semi-vegetarians and vegetarians gave more attention to nutrition and healthy eating in their day-to-day lives than did non-vegetarians.

Apart from the small number of vegetarians who are raised on a vegetarian diet, vegetarians and semi-vegetarians have made significant dietary changes; therefore it is logical that they would think more about the nutritional aspects of the foods that they eat and search more for information on healthy eating than do non-vegetarians. The converse situation, where highly nutrition and health-oriented people are more likely to become vegetarian or semi-vegetarian, is also possible.

5.6 BELIEFS ABOUT MEAT

5.6.1 Results

Three components were derived, accounting for 57.8% of the total variance. The first component (*Meat is a Necessary Dietary Component*) accounted for 41.4% of variance, with the final two components each accounting for less than eleven percent of the total variance (Table 5.6).

The first two components (Table 5.6) consisted of positive beliefs about meat: specifically, considering it to be necessary in human diets and an important strength-giver (Factor 1, *Meat is a Necessary Dietary Component*) and enjoying eating meat (Factor 2, *Red Meat Appreciation*). The remaining factor (Table 5.6) predominantly consisted of beliefs that meat causes disease and other health problems (Factor 3, *Meat is Not Healthy*).

Internal consistency was moderate to high (Table 5.6), except for *Meat is a Necessary Dietary Component*.

As would be expected, there were strong differences between vegetarians, semi-vegetarians, and non-vegetarians with regard to beliefs about meat: there were highly statistically significant differences between the groups for *all* of the items (Table 5.6). For example, no vegetarians agreed with "Meat is necessary in children's diets", while 33% of semi-vegetarians and 67% of non-vegetarians were in agreement, and 69% of vegetarians agreed with "Humans have no right to kill animals for food", while 40% of semi-vegetarians and 8% of non-vegetarians agreed. Semi-vegetarians were intermediate between the other two groups for all but two items; they agreed more

strongly than both non-vegetarians and vegetarians that "Red meat is very expensive" and disagreed more strongly with "Vegetarians are hippies or weirdos".

The most highly agreed upon belief statements ("strongly agree" and "agree") for the dietary groups are listed in Table 5.7. The most highly agreed upon item for non-vegetarians was the enjoyment of eating meat (80% agreed), while for semi-vegetarians and vegetarians it was the statement that meat production is cruel (65% of semi-vegetarians and 93% of vegetarians agreed).

TABLE 5.6
Results of principal components analysis, and cross-tabulations analysis by dietary group, of beliefs about meat

FACTOR & ITEMS	Factor loading	Non-veg.	Semi-veg.	Vegetarian	p
Factor 1: Meat is a necessary dietary component					
Eigenvalue: 8.29					
Cronbach Alpha: 0.22 (0.38 if 9 th item omitted)					
Percent of Variance: 41.4%					
Meat is important for the health of babies and toddlers	86	42 (40)	21 (39)	2 (12)	***
Meat is necessary in children's diets	85	67 (25)	33 (31)	0 (11)	***
Meat is necessary in the adult human diet	73	68 (16)	19 (29)	1 (3)	***
Meat is important for building strength	66	62 (27)	19 (37)	5 (7)	***
Red meat is the best-absorbed source of dietary iron	57	52 (39)	27 (39)	17 (26)	***
Non-vegetarians are healthier than vegetarians	47	15 (46)	11 (17)	2 (4)	***
I love to eat red meat such as beef, veal or lamb	42	82 (6)	21 (15)	0 (1)	***
Meat such as beef and lamb is unhealthy to eat	-41	3 (9)	19 (25)	64 (13)	***
I think meat is disgusting	-40	3 (5)	23 (11)	71 (12)	***
Humans have no right to kill animals for food	-39	8 (13)	40 (11)	69 (16)	***
Meat production is cruel to animals	-39	18 (26)	65 (16)	93 (4)	***

[over]

TABLE 5.6 [continued]

FACTOR & ITEMS	Factor loading	Non-veg. % Agree (% Unsure)	Semi-veg. % Agree (% Unsure)	Vegetarian	p
Factor 2: Red meat appreciation					
Eigenvalue: 2.06					
Cronbach Alpha: 0.49 (0.62 if 8 th item omitted)					
Percent of Variance: 10.3%					
I prefer to eat red meat more than fruit or vegetables	80	22 (13)	0 (4)	0 (1)	***
Nothing satisfies my appetite like a thick juicy steak	80	30 (13)	8 (0)	0 (0)	***
When I eat out to celebrate a social occasion, I usually eat some kind of red meat	72	44 (11)	12 (10)	0 (0)	***
I love to eat red meat such as beef, veal or lamb	68	82 (6)	21 (15)	0 (1)	***
Vegetarians are hippies or weirdos	52	8 (13)	2 (0)	7 (4)	***
Meat production is cruel to animals	-46	18 (26)	65 (16)	93 (4)	***
Meat is important for building strength	45	62 (27)	19 (37)	5 (7)	***
I think meat is disgusting	-45	3 (5)	23 (11)	71 (12)	***
Meat is necessary in the adult human diet	40	68 (16)	19 (29)	1 (3)	***
Non-vegetarians are healthier than vegetarians	38	15 (45)	11 (17)	2 (4)	***
Humans have no right to kill animals for food	-38	8 (13)	40 (11)	69 (16)	***
Factor 3: Meat is not healthy					
Eigenvalue: 1.21					
Cronbach Alpha: 0.73 (0.85 if last item omitted)					
Percent of Variance: 6.1%					
Meat causes heart disease	77	7 (35)	28 (39)	55 (8)	***
Meat causes cancer	74	2 (35)	19 (48)	46 (37)	***
Red meat such as beef or lamb is fattening	73	11 (15)	20 (28)	46 (28)	***
Meat such as beef and lamb is unhealthy to eat	66	3 (9)	19 (25)	64 (13)	***
I think meat is disgusting	53	3 (5)	23 (11)	71 (12)	***
Humans have no right to kill animals for food	47	8 (13)	40 (11)	69 (16)	***
Meat production is cruel to animals	44	18 (26)	65 (16)	93 (4)	***
Red meat is very expensive	43	47 (12)	54 (15)	30 (57)	***
I love to eat red meat such as beef, veal or lamb	-35	82 (6)	21 (15)	0 (1)	***

Factor loadings are in one-hundredth units and the factor loadings and explained variances are based on the rotated solution.

*** $p < 0.001$

Note that the item "Meat is more a food that men are likely to eat" did not load on to a factor. The percent of non-vegetarians, semi-vegetarians and non-vegetarians who agreed ("strongly agree" and "agree") with this statement and, in brackets, who were unsure, was 52 (19), 48 (19) and 32 (2) respectively ($p < 0.05$).

TABLE 5.7
The five strongest beliefs about meat for each dietary group (non-vegetarians, semi-vegetarians, vegetarians)

Strongest beliefs[†]	%
Non-vegetarians	
I love to eat red meat such as beef, veal or lamb	82
Meat is necessary in the adult human diet	68
Meat is necessary in children's diets	67
Meat is important for building strength	62
Meat is more a food that men are likely to eat	52
Semi-vegetarians	
Meat production is cruel to animals	65
Red meat is very expensive	54
Meat is more a food that men are likely to eat	48
Humans have no right to kill animals for food	40
Meat is necessary in children's diets	33
Vegetarians	
Meat production is cruel to animals	93
I think meat is disgusting	71
Humans have no right to kill animals for food	69
Meat such as beef or lamb is unhealthy to eat	64
Meat causes heart disease	55

[†]"strongly agree" and "agree"

VEGETARIAN PERSPECTIVE Beliefs about meat

Meat was associated with animal cruelty by the majority of vegetarian interviewees. For example, one young woman said:

I just don't like eating it [meat]. I think it's gross - dead animals - and I dislike it. I think the whole industry of animal slaughter and production and the way they're treated is really inhumane.

Female, aged 27 (lacto-ovo-vegetarian)

I always class myself as an ethical vegetarian. I know people who are health vegetarians, but I, to be honest, don't have a problem with eating meat...like indigenous people...I have absolutely no problem with Aboriginal people or, say, for example, Eskimos killing whales or something like that, to eat them and make the most of it... It's the way we produce it and the amount of suffering that goes into it - I'm on the animals' side - and the fact that it's also run purely by a monetary system. That's my main concern.

Male, aged 25 (usually vegan)

[over]

VEGETARIAN PERSPECTIVE Beliefs about meat [continued]

Another participant was also not against meat eating *per se*, but against what she saw as the abnegation of responsibility for killing animals.

I could never kill an animal to eat it and therefore I feel I've got no right to eat it. I can kind of understand fishing and probably have more sympathy for that rather than someone who's distanced themselves from the act of killing - when it's just there, just a product on the shelf.

Female, aged 25 (lacto-ovo-vegetarian)

Meat eating was viewed as unhealthy by the vegetarian interviewees, particularly as it may contribute to obesity, cancer and cardiovascular disease.

I think most diseases are related to meat eating. I'm utterly convinced.

Female, aged 50 (semi-vegetarian)

It was also perceived as unnecessary:

I don't believe you need meat in your diet.

Female, aged 25 (lacto-ovo-vegetarian)

They [meat industry television advertisements] say, "Meat is a good source of either protein or iron". That reminds me of the joke about the operation was a success but the patient died. You know, OK, good source of protein or iron, but yeah, it'll kill you with the saturated fat and toxins. So it's not a good source. It's a source of high protein and high iron, but whether that's a good thing or not...You have to take other things into account. And also it sort of masks the fact that you can get sufficient iron and protein without the meat. It's almost to the point of lying.

Female, aged 39 (lacto-vegetarian)

I don't need to kill other beings in order to maintain my own body in a healthy fashion.

Male, aged 34 (lacto-ovo-vegetarian)

Some of the vegetarians interviewed did not consider meat to be a food.

I don't look at it [meat] like it's food. I'm surprised sometimes when I see people who I've been friends with for a while or something but I've never seen them eating...When I see them eating it I think "Oh, that's funny". You know, it just doesn't seem normal to me.

Female, aged 27 (lacto-ovo-vegetarian)

5.6.2 Discussion

Items pertaining directly to vegetarianism and meat were expected to elicit strong differences in opinion between dietary groups, and this was found to be the case for all the items. This confirmed the results of previous studies, such as that of Richardson *et al.* (1994), which compared the beliefs about meat of the general population with members of The Vegetarian Society (United Kingdom).

The majority of non-vegetarians agreed that they enjoyed eating meat and that meat is necessary in the diet for adults and children. (As a comparison for the latter finding, a British survey found that 33.8% of respondents, who were randomly selected from the Leicestershire Family Health Services Authority list, agreed that meat is an essential component of a healthy diet (Goode *et al.*, 1996).) However, the majority did not consider meat to be necessary for toddlers and babies. This may imply that the Meat and Livestock Australia advertising campaign promoting the consumption of red meat by babies and toddlers did not make a large impact on respondents. In contrast to the large numbers of respondents who agreed that meat is necessary for adults and children, only 15% agreed with the statement that non-vegetarians are healthier than vegetarians, while 46% were unsure. This suggests that non-vegetarians are unsure about the healthiness of vegetarian diets, despite holding beliefs that meat is healthy and necessary in the diet. Of note is that only a fifth of non-vegetarians "prefer to eat red meat more than fruit and vegetables"; thus it appears that they enjoy eating red meat, but tend to prefer plant foods more. With regard to marketing and health promotion implications, this is promising for the promoters of plant-based diets that contain some meat.

The majority of semi-vegetarians and vegetarians believed that meat production is cruel. The literature shows that animal cruelty issues are extremely important for many vegetarians and are often a deciding or major contributing factor to their dietary choice (Beardsworth & Keil, 1992; Cooper, Wise, & Mann, 1985; Jabs *et al.*, 1998b; Rozin *et al.*, 1997) .

Vegetarians agreed more strongly with meat being unhealthy than did semi-vegetarians. A third of semi-vegetarians agreed that meat is necessary for children. On the whole, semi-vegetarians tended to be less sure about the health status of meat than either vegetarians or non-vegetarians.

Rozin has examined the moralisation of meat eating (discussed in Chapter 1) and found *disgust* (e.g. believing that eating meat is offensive, repulsive or disgusting; disliking meat because of what it is or where it comes from) to be an important element of this process (Rozin *et al.*, 1997). The survey results suggest that, indeed, vegetarians have employed the use of disgust, with almost three-quarters believing that meat is disgusting.

Of note is the low agreement with the stereotype of vegetarians as "hippies" or "weirdos" (8%, 2% and 7% of non-vegetarians, semi-vegetarians and vegetarians, respectively, agreed). Thus, vegetarianism currently appears to have a relatively positive image among non-vegetarians and, particularly, among semi-vegetarians. Of interest is that almost as many vegetarians depict themselves and/or other vegetarians as "hippies" or "weirdos" as do non-vegetarians.

5.7 BARRIERS TO VEGETARIAN DIETS

5.7.1 Results

Four components were derived from the set of barriers to consuming a vegetarian diet items, together accounting for 57.5% of the variance. One component dominated the results - *Vegetarianism Health Concerns and Appreciates Meat* (39.7% of variance). The other components each accounted for less than eight percent of the total variance (see Table 5.8).

Vegetarianism Health Concerns and Appreciates Meat (Factor 1; Table 5.8) included concern over lack of iron and protein in vegetarian diets and the enjoyment of eating meat, while *Lack of Knowledge and Convenience re Vegetarianism* (Factor 2) included items such as not knowing what to eat instead of meat and lacking appropriate cooking skills. The other components were *Social Concerns about Vegetarianism* (Factor 3) and *Social Influences Against Vegetarianism* (Factor 4). The former involved concerns about how other people would (or do) view them if they were (or are) vegetarian, while the latter involved difficulties due to friends and family eating meat.

Measures of internal reliability (Cronbach's Alpha) indicated that all of the barrier factors had high internal consistency (Table 5.8).

The frequency of agreement with each item by members of each dietary group differed at high levels of statistical significance, with the exception of "People would (or do) think that I'm a wimp or not macho enough" (4-5% of members of each group agreed with this) (Table 5.8). As would be expected, on the whole vegetarians

perceived there to be fewer barriers to vegetarian diets than non-vegetarians, with semi-vegetarians generally being intermediate. For example, 1% of vegetarians and 8% of semi-vegetarians agreed with "There is not enough protein in vegetarian diets", compared to about a quarter of non-vegetarians.

TABLE 5.8
Results of principal components analysis, and cross-tabulations analysis by dietary group, of barriers to vegetarianism

FACTOR & ITEMS	Factor loading	Non-veg.	Semi-veg.	Vegetarian	<i>p</i>
% Agree (% Unsure)					
Factor 1: Vegetarianism health concerns and appreciates meat					
Eigenvalue: 9.92					
Cronbach Alpha: 0.92					
Percent of Variance: 39.7%					
There is not enough protein in vegetarian diets	78	23 (38)	8 (15)	1 (4)	***
There is not enough iron in vegetarian diets	76	29 (38)	17 (15)	4 (7)	***
I like eating meat	70	83 (9)	36 (13)	1 (3)	***
I think humans are meant to eat meat	70	47 (25)	12 (25)	0 (3)	***
I would be (or am) worried about my health (other than lack of iron or protein)	67	30 (29)	14 (14)	3 (5)	***
Vegetarian diets are boring	67	24 (31)	10 (0)	1 (1)	***
I wouldn't (or don't) get enough energy or strength from the food	66	17 (34)	8 (17)	2 (3)	***
I do not want to change my eating habit or routine	64	59 (17)	23 (15)	4 (3)	***
Vegetarian diets are not filling enough	61	19 (31)	12 (0)	3 (1)	***
It takes too long to prepare vegetarian food	44	8 (34)	11 (6)	1 (0)	***
It is inconvenient	42	23 (26)	19 (11)	5 (3)	***
I don't want to eat strange or unusual foods	41	22 (14)	9 (6)	0 (3)	***
My family/spouse/partner won't eat vegetarian food	36	31 (14)	12 (10)	5 (5)	***

[over]

TABLE 5.8 [continued]

FACTOR & ITEMS	Factor loading	Non-veg. % Agree (% Unsure)	Semi-veg. % Agree (% Unsure)	Vegetarian	p
Factor 2: Lack of knowledge and convenience re vegetarianism					
Eigenvalue: 1.80					
Cronbach Alpha: 0.86					
Percent of Variance: 7.2%					
I don't know what to eat instead of meat	72	22 (17)	9 (8)	4 (1)	***
I need more information about vegetarian diets	69	42 (17)	35 (10)	14 (9)	***
I lack the right cooking skills	68	16 (15)	6 (6)	1 (0)	***
I don't have enough willpower	59	20 (16)	14 (2)	2 (1)	***
There is too limited a choice when I eat out	57	35 (22)	37 (10)	31 (6)	***
It is inconvenient	54	23 (26)	19 (11)	5 (3)	***
It takes too long to prepare vegetarian food	48	8 (34)	11 (6)	1 (0)	***
Vegetarian options are not available where I shop or in the canteen or at my home	44	13 (21)	17 (2)	12 (7)	***
Factor 3: Social concerns about vegetarianism					
Eigenvalue: 1.53					
Cronbach Alpha: 0.84					
Percent of Variance: 6.1%					
I don't want people to stereotype me negatively (e.g. that I must be strange)	77	8 (14)	8 (0)	5 (4)	***
People would (or do) think that I'm a wimp or not macho enough	75	4 (11)	4 (6)	5 (5)	NS
I don't want to eat strange or unusual foods	57	22 (14)	9 (6)	0 (3)	***
I would (or do) feel conspicuous among others	55	9 (20)	8 (8)	8 (7)	**
Vegetarian options are not available where I shop or in the canteen or at my home	51	13 (21)	17 (2)	12 (7)	***
Someone else decides on most of the food I eat	44	10 (7)	6 (4)	1 (2)	**
Vegetarian diets are not filling enough	36	19 (31)	12 (0)	3 (1)	***
It takes too long to prepare vegetarian food	35	8 (34)	11 (6)	1 (0)	***
Factor 4: Social influences against vegetarianism					
Eigenvalue: 1.11					
Cronbach Alpha: 0.79 (0.81 if last item omitted)					
Percent of Variance: 4.5%					
My family eats meat	89	43 (10)	38 (2)	20 (4)	***
My friends eat meat	87	32 (13)	27 (4)	18 (3)	***
I would (or do) feel conspicuous among others	41	9 (20)	8 (8)	8 (7)	**
My family/spouse/partner won't eat vegetarian food	39	31 (14)	12 (10)	5 (5)	***

Factor loadings are in one-hundredth units and the factor loadings and explained variances are based on the rotated solution.

*** $p < 0.001$, ** $p < 0.01$

The five strongest barriers ("strongly agree" and "agree") for each of the three dietary groups are listed in Table 5.9. For non-vegetarians, enjoyment of eating meat was the strongest barrier to the consumption of a vegetarian diet, with over 80% in agreement with this item. "My family eats meat" was the strongest barrier for semi-vegetarians (38% agreed with this statement). The difficulties of being vegetarian for vegetarians were similar to those of semi-vegetarians, although the enjoyment of eating meat was absent.

TABLE 5.9
The five strongest perceived barriers to the consumption of a vegetarian diet for each dietary group (non-vegetarians, semi-vegetarians, vegetarians)

Strongest barriers to consuming a vegetarian diet[†]	%
Non-vegetarians	
I like eating meat	83
I do not want to change my eating habit or routine	59
I think humans are meant to eat meat	47
My family eats meat	43
I need more information about vegetarian diets	42
Semi-vegetarians	
My family eats meat	38
There is too limited a choice when I eat out	37
I like eating meat	36
I need more information about vegetarian diets	35
My friends eat meat	27
Vegetarians	
There is too limited a choice when I eat out	31
My family eats meat	20
My friends eat meat	18
I need more information about vegetarian diets	14
Vegetarian options are not available where I shop or in the canteen or at my home	12

[†]"strongly agree" and "agree"

VEGETARIAN PERSPECTIVE Barriers to vegetarianism

The vegetarian interviewees found few difficulties with vegetarianism *per se*, but they often found other people's reactions to their diet irritating, particularly family members.

My friends certainly are [supportive of my dietary choice], but some members of my family aren't. For instance, we used to go out for birthday lunches and dinners, and I would want to go to a vegetarian restaurant, of course, on my birthday, and there'd be this big fight about it, because a certain male member of the family is sort of a bit macho - "I must have my meat", you know, as if he misses out on one meat meal he'll shrivel up or something like that.

Female, aged 39 (lacto-vegetarian)

The only difficult parts of it were other people's reactions. If I went to somebody's place and they hadn't seen me for a few months, most would offer me a meal. I know that sometimes there wouldn't be the range of food that I would like to eat, or at other times, people - parents mostly - would make comments about why... "Couldn't you just eat a small amount of chicken?" or "Couldn't you just eat a small amount of..."...not, you know, taking any account of my decisions. Yet I was an adult with a child, but still treated as a child by parents. It's a weird thing.

Female, aged 34 (lacto-ovo-vegetarian)

Negative reactions from non-vegetarians could sometimes increase in intensity if a child was being brought up on a vegetarian diet. For example, one participant's mother once fed pea and ham soup to the participant's child, who was being brought up on a vegetarian diet. Her mother was not the only opponent:

It's hard. Like people say to me, "Oh, aren't you taking away your son's choice?" And I say to them, "Isn't it up to me to guide him as a parent as to how animals are being exploited?" So, yeah, I get a lot of that.

Female, aged 23 (lacto-vegetarian)

[over]

VEGETARIAN PERSPECTIVE Barriers to vegetarianism [continued]

A few of the vegetarian interviewees thought that vegetarians needed to be particularly careful to ensure they were obtaining enough of particular nutrients, such as iron, although they all believed that it is entirely possible to eat a nutritionally adequate vegetarian diet and that nutrition does not usually present a barrier to vegetarianism. However, they were often confronted by concerned friends and family members who believed that meat consumption was nutritionally vital.

I guess there was always the initial stuff about, you know, you won't get your protein and you won't get your iron, but I've never had any difficulties. And you know, the calcium once you give up dairy products as well. But I've never had any difficulties in getting them.... I think the main problem is that's what the mainstream think and obviously this is aided by people like the Australian Dairy Corporation or whatever they're called, doing all those supposed good health messages on TV and all that kind of stuff. I guess it's an interesting and empowering experience when you come across that initial thing of like "Oh, if you're a vegetarian, you're going to miss out on all this really good for you stuff that's in meat", and then, you know, you find out that meat is low in fibre, and you know, all the cancer stuff and the thing about the protein being greatly exaggerated and all that kind of thing.

Female, aged 25 (vegan)

Doctors occasionally presented problems for the vegetarians. One woman was discouraged from becoming vegetarian by her doctor and so continued to eat meat for a number of years:

My doctor had me convinced that I'd die of anaemia if I didn't eat meat.

Female, aged 39 (lacto-vegetarian)

Another participant related a story about his vegetarian work-mate and the difficulty she was currently having with her doctor:

I've actually been talking to somebody at work recently, who's a middle-aged woman - I suppose she'd be about thirty-five, forty. She's going through quite a lot of "women's stuff", you know, and she has an iron deficiency. She came up against a doctor who's saying, "You have to eat meat", and she's a vegetarian.

Male, aged 25 (lacto-ovo vegetarian)

[over]

VEGETARIAN PERSPECTIVE Barriers to vegetarianism [continued]

Some vegetarians noted that it could be difficult finding vegetarian food at restaurants, but the majority felt that the situation had improved since they first became vegetarian, with there now being more vegetarian restaurants and an increase in options at non-vegetarian restaurants.

It [being vegetarian] definitely affects you whenever you go out to eat, because it can be really hard. As long as you know where you can go to get food it's OK though. Like when I was first becoming vegetarian I just thought, "Oh god, I'm going to have to take my own food everywhere!"

Female, aged 23 (lacto-vegetarian)

And in things like restaurants as well you're gradually getting more meals put on the menu. You used to go into a restaurant and there's just the obligatory salad or something and you'd say, "Oh right, I'll have to eat that". There are gradually more things available. But I tend to go to things like Indian [restaurants] and that anyway, which have more of the vegetarian stuff.

Male, aged 25 (lacto-ovo-vegetarian)

5.7.2 Discussion

In the expectation that perceived barriers would correspond to dietary behaviour, it was predictable that vegetarians would find fewest barriers to eating a vegetarian diet, with non-vegetarians finding the most barriers, and semi-vegetarians intermediate.

For non-vegetarians, the enjoyment of eating meat was the strongest barrier to consuming a vegetarian diet, followed by not wishing to change their dietary behaviour. These were more important than perceived health or social barriers to vegetarianism (for example, concern about how one would appear to others if one were vegetarian was relatively low). This suggests that the promoters of plant-based diets need to focus on the tastiness and convenience of plant-based meals and perhaps meat analogues. According to the results (Table 5.9), about 40% of non-vegetarians would appreciate such information on vegetarian eating.

In contrast, the strongest barriers to vegetarianism for semi-vegetarians were the social and the physical environment, as well as enjoyment of the taste of meat. Socio-environmental barriers were also important for vegetarians. For example, finding enough vegetarian food options when eating out was perceived as a barrier for vegetarians and semi-vegetarians. Thus, it appears that some vegetarians and semi-vegetarians perceive a need for restaurants and cafes to provide more vegetarian options on the menu. A lack of vegetarian options may have some health implications for vegetarians and others if they are unable to eat healthy and varied meat-free meals when they eat out.

Another important socio-environmental barrier to the consumption of a vegetarian diet for semi-vegetarians and vegetarians was having a family that eats meat. This concurs with a United States qualitative study that found that tension was often present between vegetarians and their non-vegetarian parents or adult children, particularly with regard to family events that involved food and to health concerns about vegetarian diets (Jabs *et al.*, 2000). It is possible that there is a link between sex and the barrier of a meat-eating family; in the current study, more vegetarian and semi-vegetarian women than men agreed that having a meat-eating family was a barrier to the consumption of a vegetarian diet (vegetarians: 11% of men and 27% of women agreed; semi-vegetarians: 30% of men and 42% of women agreed; see Appendix 10). Whilst this trend was not statistically significant for this sample, other studies on more general healthy eating behaviours have found that family preferences can be a problem for women (e.g. see Crawford & Baghurst, 1990; Lloyd *et al.*, 1995). The existence of this trend among vegetarians and semi-vegetarians needs to be verified by a future study. However, it is plausible that a higher proportion of

vegetarian and semi-vegetarian women compared to men would cite a meat-eating family as a difficulty associated with the consumption of a vegetarian diet. This is because: (a) generally there are more women than men who are vegetarian, which presumably would result in some vegetarian women having a non-vegetarian partner, and (b) women usually perform most of the food preparation (Axelson, 1986; Kemmer, Anderson, & Marshall, 1998; Warde & Hetherington, 1994; Worsley & Worsley, 1989) - trying to cater for everyone's tastes, particularly if someone eats meat, can be difficult.

5.8 BENEFITS OF VEGETARIAN DIETS

5.8.1 Results

Three components were derived, accounting for 65.9% of total variance. The first component, *Peace and Contentment Benefits of Vegetarianism*, accounted for 54.4% of the variance, while the remaining two each accounted for less than seven percent (see Table 5.10).

The first component (Table 5.10) consisted of feminist and peaceful (both inner peace and external peace) benefits of vegetarianism, along with taste and health benefits (Factor 1, *Peace and Contentment Benefits of Vegetarianism*). *Health Benefits of Vegetarianism* (Factor 2) included the prevention of disease, decreased saturated fat intake, and staying healthy in general. The final component focused on benefits of a less self-oriented, more altruistic nature, such as improvements in animal welfare, increased efficiency of food production, environmental improvement and decreases in Third World hunger (Factor 3, *Animal Welfare, Environmental and Hunger Benefits of Vegetarianism*).

Measures of internal reliability (Cronbach's Alpha) indicated that all of the benefits of vegetarianism factors had high internal consistency (Table 5.10).

There were highly significant differences between vegetarians, semi-vegetarians and non-vegetarians with regard to level of agreement with all of the benefits of vegetarian diet items (Table 5.10). As expected, vegetarians agreed with each benefit more strongly than non-vegetarians, with semi-vegetarians intermediate. Of note is the high proportion of "unsure" answers for non-vegetarians; they appeared to be less sure about the benefits of eating a vegetarian diet than the barriers to eating such a diet.

The main five perceived benefits ("strongly agree" and "agree") of vegetarian diets for non-vegetarians, listed in Table 5.11, were mainly health-related, with increased intake of fruit and vegetables perceived to be the most important benefit. This was also the most important perceived benefit for semi-vegetarians, with the remaining four benefits also health-related (Table 5.11). In contrast, there was a relatively lower health focus for vegetarians, with the two most important benefits of a vegetarian diet being non-health related (animal welfare and environmental benefits), although the absolute importance of health issues was stronger for vegetarians than for either of the other two dietary groups (Table 5.11).

TABLE 5.10
Results of principal components analysis, and cross-tabulations analysis by dietary group, of
benefits of vegetarianism

FACTOR & ITEMS	Factor loading	Non-veg. % Agree (% Unsure)	Semi-veg. % Agree (% Unsure)	Vegetarian	p
Factor 1: Peace and contentment benefits of vegetarianism					
Eigenvalue: 13.07					
Cronbach Alpha: 0.96					
Percent of Variance: 54.4%					
Help the feminist cause	71	3 (27)	6 (46)	21 (53)	***
Be less aggressive	70	6 (36)	28 (43)	41 (37)	***
Be more content with myself	69	8 (36)	43 (33)	85 (12)	***
Help create a more peaceful world	67	6 (24)	25 (48)	82 (14)	***
Satisfy my religious and/or spiritual needs	66	3 (19)	29 (16)	69 (11)	***
Have a tastier diet	64	7 (34)	51 (25)	90 (8)	***
Have a better quality of life	57	12 (38)	56 (30)	88 (11)	***
Be fit	55	17 (33)	60 (26)	72 (21)	***
Save money	54	19 (37)	49 (28)	52 (24)	***
Have plenty of energy	49	16 (47)	52 (35)	80 (19)	***
Eat a greater variety of interesting foods	48	22 (33)	63 (24)	88 (8)	***
Lower my chances of getting food poisoning	47	16 (34)	59 (20)	76 (17)	***
Increase my control over my own health	46	19 (39)	59 (34)	89 (8)	***
Stay healthy	45	25 (38)	72 (17)	94 (6)	***
Increase the efficiency of food production	41	12 (44)	49 (36)	85 (13)	***
Live longer	38	15 (49)	46 (46)	73 (25)	***
Decrease hunger in the Third World	38	11 (40)	37 (39)	78 (15)	***
Help the environment	37	18 (36)	65 (20)	97 (3)	***
Factor 2: Health benefits of vegetarianism					
Eigenvalue: 1.65					
Cronbach Alpha: 0.95					
Percent of Variance: 6.9%					
Prevent disease in general (e.g. heart disease, cancer)	74	31 (41)	85 (11)	89 (10)	***
Decrease saturated fat intake in my diet	74	64 (22)	81 (9)	89 (9)	***
Control my weight	71	38 (30)	53 (21)	56 (23)	**
Stay healthy	67	25 (38)	72 (17)	94 (6)	***
Live longer	67	15 (49)	46 (46)	73 (25)	***
Increase my control over my own health	61	19 (39)	59 (34)	89 (8)	***
Be fit	58	17 (33)	60 (26)	72 (21)	***
Have a better quality of life	57	12 (38)	56 (30)	88 (11)	***
Have plenty of energy	57	16 (47)	52 (35)	80 (19)	***
Eat more fruit and vegetables	54	73 (11)	85 (7)	94 (2)	***
Eat a greater variety of interesting foods	48	22 (33)	63 (24)	88 (8)	***
Be healthier by decreasing my intake of chemicals, steroids and antibiotics which are found in meat	46	27 (44)	78 (17)	93 (6)	***
Have a tastier diet	45	7 (34)	51 (25)	90 (8)	***
Be more content with myself	41	8 (36)	43 (33)	85 (12)	***
Lower my chances of getting food poisoning	36	16 (34)	59 (20)	76 (17)	***

[over]

TABLE 5.10 [continued]

FACTOR & ITEMS	Factor loading	Non-veg. % Agree (% Unsure)	Semi-veg. % Agree (% Unsure)	Vegetarian % Agree (% Unsure)	<i>p</i>
Factor 3: Animal welfare, environmental and hunger benefits of vegetarianism					
Eigenvalue: 1.10					
Cronbach Alpha: 0.95					
Percent of Variance: 4.6%					
Help animal welfare/rights	79	33 (32)	70 (17)	99 (1)	***
Increase the efficiency of food production	75	12 (44)	49 (36)	85 (13)	***
Help the environment	75	18 (36)	65 (20)	97 (3)	***
Decrease hunger in the Third World	75	11 (40)	37 (39)	78 (15)	***
Be healthier by decreasing my intake of chemicals, steroids and antibiotics which are found in meat	57	27 (44)	78 (17)	93 (6)	***
Help create a more peaceful world	54	6 (24)	25 (48)	82 (14)	***
Lower my chances of getting food poisoning	44	16 (34)	59 (20)	76 (17)	***
Eat a greater variety of interesting foods	40	22 (33)	63 (24)	88 (8)	***
Increase my control over my own health	40	19 (39)	59 (34)	89 (8)	***
Have a tastier diet	38	7 (34)	51 (25)	90 (8)	***
Be more content with myself	37	8 (36)	43 (33)	85 (12)	***
Satisfy my religious and/or spiritual needs	36	3 (19)	29 (16)	69 (11)	***
Have a better quality of life	36	12 (38)	56 (30)	88 (11)	***

Factor loadings are in one-hundredth units and the factor loadings and explained variances are based on the rotated solution.

*** $p < 0.001$, ** $p < 0.01$

TABLE 5.11
The five strongest perceived benefits of the consumption of a vegetarian diet for each dietary group (non-vegetarians, semi-vegetarians, vegetarians)

Strongest benefits of consuming a vegetarian diet[†]	%
Non-vegetarians	
Eat more fruit and vegetables	73
Decrease saturated fat intake in my diet	64
Control my weight	38
Help animal welfare/rights	33
Prevent disease in general (e.g. heart disease, cancer)	31
Semi-vegetarians	
Eat more fruit and vegetables*	85
Prevent disease in general (e.g. heart disease, cancer)*	85
Decrease saturated fat intake in my diet	81
Be healthier by decreasing my intake of chemicals, steroids and antibiotics which are found in meat	78
Stay healthy	72
Vegetarians	
Help animal welfare/rights	99
Help the environment	97
Stay healthy [‡]	94
Eat more fruit and vegetables [‡]	94
Be healthier by decreasing my intake of chemicals, steroids and antibiotics which are found in meat	93

[†]"strongly agree" and "agree"

* 85.1% agreed that eating more fruit and vegetables was a benefit of consuming a vegetarian diet, while 85.0% agreed that disease prevention was a benefit

[‡] 94.1% agreed with both of these items, however, 3.9% disagreed with "Eat more fruit and vegetables" while no-one disagreed with "Stay healthy"

VEGETARIAN PERSPECTIVE Benefits of vegetarianism

The vegetarian interviewees believed that there are a variety of benefits associated with vegetarianism. A decrease in animal cruelty was perhaps the most important, although health benefits were also considered to be very important. The latter included a decrease in the risk of various diseases perceived to be associated with meat, such as cancer and heart disease. Participants sometimes noted improvements in their own health when they became vegetarian. For example, one interviewee had suffered from an ailment as a young woman, which ended when she became vegetarian.

Not only did I get well from the problem, which took about six months, but there were all these other improvements in my general health which I had just taken for granted as the way humans were. Well, for example, I didn't have such regular bowel movements [as a meat-eater], but I didn't think...I just thought that was normal. I mean I wasn't sick, but I wasn't as well as I could be either. I just noticed my eyes were brighter and my skin was better and my gums didn't ever bleed and I was extremely regular, I had more energy, and given how sick I was it was amazing that I was having these other side results, and I knew that they must have been linked to the [vegetarian] diet, because there wasn't any other reason why they would change. And so my earlier problems in fact were symptoms of not being very well, but neither my doctors nor I would have ever classified those as health problems, you know. They were just ordinary and normal things that most people in the population suffer from.

Female, aged 50 (semi-vegetarian)

I believe that we were meant to consume, you know, fruits, vegetables, grains, seeds and nuts and so forth. I think that, you know, gives us the right fuel for our bodies to operate. And I think that's how we're going to get the best out of ourselves. I mean, if there's something...if the body is not functioning properly, the brain can't function properly, and the mind can't function to its full capacity. I think consuming animal products and so forth limits society's potential because we're not at our healthiest, so to speak. So, I think diet is definitely central and if we all had a healthy diet - and that, I believe, is a vegetarian one - I think we'd all be better off, much better off than what we are today.

Male, aged 40 (lacto-vegetarian)

The hormones, steroids, and antibiotics believed to be present in meat were a source of concern to interviewees, and therefore the lack of them in a vegetarian diet was considered beneficial. Eating animals kept and killed under highly stressful conditions was seen as having detrimental health effects, due to toxins produced from the adrenalin released. As one participant said:

I certainly don't want to eat a nicely packaged lump of suffering. It's not what I need in my system.

Male, aged 34 (lacto-ovo-vegetarian)

[over]

VEGETARIAN PERSPECTIVE Benefits of vegetarianism [continued]

Most participants felt they had a greater sense of well-being and control over their own health since becoming vegetarian.

I feel that my body has more control over itself through consuming vegetarian food rather than animal products.

Male, aged 40 (usually vegan)

The majority of participants believed that not eating meat has a positive effect on the environment, although only one participant cited environmental reasons as the primary benefit of vegetarianism.

I guess my interest is in the horticultural line of saving the earth. It just made so much sense. I mean, everywhere I look in Australia I see my land totally degraded, mostly by the sheep and cattle industry. And OK, so grain growing also uses the land, but I believe you can be putting things back into the land, whereas I think animal husbandry tends to totally degrade it. So I'd have to say that was my major influence [to become vegetarian].

Female, aged 48 (semi-vegetarian)

Vegetarianism was seen as a way to diminish or end world hunger, as grain would be available for direct human consumption instead of being fed to livestock.

It just takes up a lot more energy and resources to produce meat than to produce grains and so on.

Female, aged 39 (lacto-vegetarian)

I see vegetarianism as a more efficient and effective part of a whole global plan to make sure everybody has what human beings basically need, not just to survive but to actually live.

Female, aged 50 (semi-vegetarian)

Some thought that one benefit of vegetarianism was increased peaceful tendencies in one's life:

I think there's something to the theory that if you're leading a pacifist life that's not harming other beings, like not killing animals (even if you're not doing it yourself), then you tend to be more open to other things. Whereas, if you're leading a life that's based on destroying other beings unnecessarily, you tend to seek out things that reinforce that sort of style of life.

Female, aged 39 (usually vegan)

[over]

VEGETARIAN PERSPECTIVE Benefits of vegetarianism [continued]

Vegetarian food was perceived to taste better than an omnivorous diet, contrary to the belief of many meat-eaters. This was thought to be due partly to an increase in the variety of food consumed.

Vegetarian food tastes better! There is a perception that vegetarian food is bland, that it's boiled vegetables or something and that's all that you eat, and yet the food that we eat at home is so varied and tasty and we enjoy cooking it.

Female, aged 34 (lacto-ovo-vegetarian)

And so it used to really get to me when people used to say "But what do you eat then?" And it's like, well what don't you eat? The only thing I don't eat is meat. Like I think vegetarians are more likely to try other things you know, like spices, and people say vegetarianism might be bland and everything, and I just can't believe it! Just because you grew up on meat and three veg., soggy overcooked veg., doesn't mean all you eat [as a vegetarian] is boiled rice and, you know, overcooked vegetables! So I just think there's a lot of benefit to vegetarianism.

Female, aged 25 (lacto-ovo-vegetarian)

5.8.2 Discussion

It is logical that vegetarians perceive there to be more benefits associated with a vegetarian diet than non-vegetarians, with semi-vegetarians intermediate. Health-related benefits were most important for non-vegetarians and semi-vegetarians. However, animal welfare benefits were the fourth most important benefit for non-vegetarians. Animal welfare and environmental benefits were more important for vegetarians than health benefits, although health benefits were still important (and the absolute importance of health benefits was stronger for vegetarians than for non-vegetarians or semi-vegetarians). Other research has found that these three sets of benefits (health, animal welfare, environmental) are the main reasons for vegetarians' dietary behaviour (Beardsworth & Keil, 1991; N. J. Richardson, 1994; Rozin *et al.*, 1997).

There appears to be a high awareness of possible health benefits associated with a vegetarian diet, including among non-vegetarians. This concurs with the results of Kalof and Dietz's (Dietz *et al.*, 1994; Kalof *et al.*, 1999) survey that examined agreement with four benefits of vegetarian diets, introduced in Chapter 1, where 56% of non-vegetarians at least partially agreed that a vegetarian diet tends to be healthier than a diet that includes red meat. In the current survey, beliefs that the vegetarian diet has health benefits were held despite many non-vegetarians believing that meat is healthy and indeed *necessary* in the diet. Respondents were not asked to define the quantity of meat they believed to be healthy; it is possible that they may consider small amounts of meat in combination with relatively large quantities of plant foods to be optimal for health. This requires further study.

The most important way to eat a healthier diet given by respondents in the 1985 Victorian Nutrition Study (Australia) was to "eat more fruit and vegetables", followed by "consume less fat" (Worsley, 1988a). The finding that these are currently also the most important benefits of eating a vegetarian diet, as perceived by non-vegetarians, suggests that there has been little change in the Australian perception of what constitutes a healthy diet.

5.9 PERSONAL VALUES

5.9.1 Results

Principal components analysis of personal values items resulted in six components, together accounting for 56.5% of total variance. One component dominated the results – *Universal* (22.4% of variance) – with the other components each accounting for less than twelve percent of total variance (Table 5.12).

"Unity of nature" and "A world of beauty" had the strongest loadings on the first component (Factor 1, *Universal*). The second component was characterised by "Honouring of parents and elders", "Devout" and "Respect for tradition" (Factor 2, *Tradition*). "Enjoying life" and "Healthy" were important for Factor 3 (*Enjoying a Healthy, Exciting Life*), with "Authority", "Social power" and "Wealth" being important for Factor 4 (*Power*). "Self-discipline" and "Social order" characterised Factor 5 (*Security and Conformity*) with "Moderate", "Successful" and "Independent" having the strongest loadings on the final component (Factor 6, *Moderate and Successful*).

Internal consistency was high or moderate for all of the factors (Table 5.12).

There were strong differences between the three dietary groups, particularly with regard to items loading on the *Universal* and *Tradition* factors (Table 5.12). For example, vegetarians were more likely than non-vegetarians to state that "Unity with nature", "A world of beauty", "Protecting the environment", and "Equality" were very important guiding principles in their life, but less likely to state that "Honouring of parents and elders" and "Respect for tradition" were very important. Semi-vegetarians were intermediate between vegetarians and non-vegetarians for about half of the items (or three-quarters of the items where statistically significant differences were present between the dietary groups). Interestingly, "Healthy" was more important for semi-vegetarians than the other two groups, with the levels of importance for non-vegetarians and vegetarians being similar. For some items, there were no statistically significant differences between the groups, such as for "Helpful", "Enjoying life", and "Authority".

TABLE 5.12
Results of principal components analysis, and cross-tabulations analysis by dietary group, of personal values

FACTOR & ITEMS	Factor loading	Non-veg. % Very Important	Semi-veg. (% Fairly Important)	Vegetarian	p
Factor 1: Universal					
Eigenvalue: 5.14					
Cronbach Alpha: 0.80					
Percent of Variance: 22.4%					
Unity with nature (fitting into nature)	77	25 (57)	55 (38)	71 (27)	***
A world of beauty (beauty of nature and the arts)	74	27 (55)	69 (24)	71 (26)	***
Protecting the environment (preserving nature)	68	50 (45)	75 (22)	87 (13)	***
Equality (equal opportunity for all)	61	61 (32)	79 (19)	87 (13)	***
Inner harmony (peace with myself)	56	59 (36)	77 (21)	79 (18)	***
A varied life (filled with challenge, novelty and change)	54	29 (53)	46 (44)	62 (34)	***
Helpful (working for the welfare of others)	42	36 (58)	48 (46)	44 (52)	NS
An exciting life (stimulating experiences)	38	22 (57)	43 (38)	47 (43)	***
Factor 2: Tradition					
Eigenvalue: 2.56					
Cronbach Alpha: 0.65					
Percent of Variance: 11.1%					
Honouring of parents and elders (showing respect)	70	68 (30)	68 (28)	32 (52)	***
Devout (holding to religious faith and belief)	69	20 (34)	13 (40)	15 (24)	*
Respect for tradition (preservation of time-honoured customs)	68	27 (47)	22 (63)	14 (27)	***
Helpful (working for the welfare of others)	38	36 (58)	48 (46)	44 (52)	NS
Factor 3: Enjoying a healthy, exciting life					
Eigenvalue: 1.78					
Cronbach Alpha: 0.71					
Percent of Variance: 7.7%					
Enjoying life (enjoying food, sex, leisure etc.)	78	67 (31)	72 (26)	60 (36)	NS
Healthy (not being ill physically or mentally)	57	75 (23)	91 (9)	75 (26)	*
An exciting life (stimulating experiences)	48	22 (57)	43 (38)	47 (43)	***
Family security (safety for loved ones)	39	83 (16)	78 (18)	75 (23)	NS
Successful (achieving goals)	37	37 (55)	48 (44)	46 (46)	NS
A varied life (filled with challenge, novelty and change)	35	29 (53)	46 (44)	62 (34)	**

[over]

TABLE 5.12 [continued]

FACTOR & ITEMS	Factor loading	Non-veg. % Very Important	Semi-veg. (% Fairly Important)	Vegetarian	<i>p</i>
Factor 4: Power					
Eigenvalue: 1.32					
Cronbach Alpha: 0.64					
Percent of Variance: 5.8%					
Authority (the right to lead or command)	73	6 (25)	6 (25)	2 (17)	NS
Social power (control over others)	68	1 (11)	4 (8)	0 (10)	NS
Wealth (material possessions, money)	64	9 (53)	8 (42)	6 (27)	***
Preserving my public image (protecting my "face")	58	14 (45)	13 (43)	2 (19)	***
Factor 5: Security and conformity					
Eigenvalue: 1.15					
Cronbach Alpha: 0.59					
Percent of Variance: 5.0%					
Self-discipline (self-restraint)	66	36 (56)	42 (47)	33 (46)	**
Social order (stability of society)	63	30 (47)	43 (41)	23 (51)	NS
Family security (safety for loved ones)	53	83 (16)	78 (18)	75 (23)	NS
Inner harmony (peace with myself)	41	59 (36)	77 (21)	79 (18)	***
Factor 6: Moderate and successful					
Eigenvalue: 1.03					
Cronbach Alpha: 0.59					
Percent of Variance: 4.5%					
Moderate (avoiding extremes of feeling and action)	63	17 (61)	30 (44)	15 (36)	***
Successful (achieving goals)	55	37 (55)	48 (44)	46 (46)	NS
Independent (self-reliant, self-sufficient)	54	47 (46)	66 (35)	68 (26)	***
Helpful (working for the welfare of others)	51	36 (58)	48 (46)	44 (52)	NS

Factor loadings are in one-hundredth units and the factor loadings and explained variances are based on the rotated solution.

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

The five most important personal values ("very important") for non-vegetarians, semi-vegetarians and vegetarians are shown in Table 5.13. "Family security" and "Healthy" were most important for non-vegetarians. "Healthy" and "Equality" were most important for semi-vegetarians, while "Equality" and "Protecting the Environment" were ranked equal first for vegetarians.

TABLE 5.13
The five strongest personal values for each dietary group (non-vegetarians, semi-vegetarians, vegetarians)

Strongest personal values[†]	%
Non-vegetarians	
Family security (safety for loved ones)	83
Healthy (not being ill physically or mentally)	75
Honouring of parents and elders (showing respect)	68
Enjoying life (enjoying food, sex, leisure etc.)	67
Equality (equal opportunity for all)	61
Semi-vegetarians	
Healthy (not being ill physically or mentally)	91
Equality (equal opportunity for all)	79
Family security (safety for loved ones)	78
Inner harmony (peace with myself)	77
Protecting the environment (preserving nature)	75
Vegetarians	
Equality (equal opportunity for all) [‡]	87
Protecting the environment (preserving nature) [‡]	87
Inner harmony (peace with myself)	79
Healthy (not being ill physically or mentally)	75
Family security (safety for loved ones)	75

[†]"very important"

[‡] these items were ranked equally in both relevant response categories (i.e. "very important" and "fairly important"; no vegetarians stated that these values were not important or that they were opposed to the values)

5.9.2 Discussion

This study has confirmed findings of previous work suggesting that vegetarians have more universal and less traditional values than non-vegetarians (Allen *et al.*, 2000; Dietz *et al.*, 1995; Kalof *et al.*, 1999; Worsley *et al.*, 1995). Allen *et al.* (2000) found that non-vegetarians were more likely to support hierarchical domination rather than peace, equality and social justice. Although this was partly confirmed, in that vegetarians held equality and other universal values such as protection of the environment and inner harmony to be more important than did non-vegetarians, there were no significant differences between dietary groups for "Authority" and "Social power". However, there were differences for "Wealth" and "Preserving my public image", which Schwartz (1992) also labelled as *Power* values. Thus, further research

is needed on the strength of power-oriented values among vegetarians and non-vegetarians.

The findings highlight the interrelationship between dietary behaviour and world-views, although, being a cross-sectional study, it cannot provide information on whether diet helped shape the formation of particular values or if the reverse was true. However, other research suggests that the latter is more likely (Kalof *et al.*, 1999; Pollay & Gallagher, 1990).

5.10 CONCLUSION

This chapter has identified the items that were grouped together by respondents within each of the various main sections of the questionnaire. To reiterate, the factors were: (a) use of information sources - *Use Unorthodox Sources*, *Use Mass Media and Advertising*, *Use Social Sources*, *Use Orthodox Sources*, *Use Specialised Media A*, and *Use Specialised Media B*; (b) trust in information sources - *Trust Advertising and Mass Media*, *Trust Social Sources*, *Trust Unorthodox Sources*, *Trust Orthodox Sources*, *Trust Specialised Media*, and *Trust Food Labels and Internet*; (c) beliefs about meat - *Meat is a Necessary Dietary Component*, *Red Meat Appreciation*, and *Meat is Not Healthy*; (d) barriers to vegetarian diets - *Vegetarianism Health Concerns and Appreciates Meat*, *Lack of Knowledge and Convenience re Vegetarianism*, *Social Concerns about Vegetarianism*, and *Social Influences Against Vegetarianism*; (e) benefits of vegetarian diets - *Peace and Contentment Benefits of Vegetarianism*, *Health Benefits of Vegetarianism*, and *Animal Welfare, Environmental and Hunger Benefits of Vegetarianism*; and (f) personal values - *Universal*, *Tradition*, *Enjoying a*

Healthy, Exciting Life, Power, Security and Conformity, and Moderate and Successful.

There were strong differences between vegetarians, semi-vegetarians, and non-vegetarians for most of the questionnaire items, thus confirming hypothesis 1. For example, vegetarians were more likely than non-vegetarians to use and trust unorthodox information sources, to perceive there to be benefits associated with vegetarian diets, to agree that meat production is cruel, and to hold *Universal* values in high regard, but were less likely than non-vegetarians to agree that meat is necessary for humans, to use and trust orthodox sources, mass media and advertising, to perceive there to be barriers to vegetarian diets, or to hold *Tradition* values in high regard. However, further research is required on the power-oriented values of vegetarians and non-vegetarians, as differences between the dietary groups were present for only half of the *Power* items. The responses of semi-vegetarians were generally intermediate between vegetarians and non-vegetarians, as predicted. The results imply that dietary behaviour is related to a wider variety of issues than simply diet: the world-views of vegetarians and non-vegetarians appear to differ.

The results have implications for the promotion of meat and plant-based diets. For example, many non-vegetarians and semi-vegetarians agreed that there are health benefits associated with vegetarian diets, although they also perceived there to be strong (mainly non-health related) barriers to consuming a vegetarian diet, particularly due to their enjoyment of eating meat. However, many also agreed that meat is necessary for humans. Therefore, it appears likely that for non-vegetarians and semi-

vegetarians a plant-based diet that contains some meat would be preferable to a no-meat diet.

Chapter 6

THE FACTORS ASSOCIATED WITH MEAT CONSUMPTION*

6.1 INTRODUCTION

The reasons for particular food choices are complex and diverse (Furst *et al.*, 1996; Lindeman & Stark, 1999; Norman & Conner, 1996). This chapter aims to identify the factors that may influence meat consumption, such as beliefs about meat and nutrition, barriers to and benefits of vegetarianism, demography, personal values, use of and trust in information sources, and number of vegetarian friends and family (aim 2; Chapter 2).

The theory that beliefs and attitudes are causally related to behaviour is well established (Baranowski, Weber Cullen, & Baranowski, 1999; Fishbein & Ajzen, 1975; Shepherd & Sparks, 1994). For example, according to the theory of reasoned action, combinations of beliefs, attitudes and subjective norms predict behavioural intentions and, thus, behaviour (Fishbein & Ajzen, 1975). Strong relationships between food choice and attitudes and beliefs have been found (N. J. Richardson *et al.*, 1993; Shepherd & Sparks, 1994).

Worsley and Skrzypiec (1998a) found that meat appreciation (the enjoyment of eating meat) was a positive predictor of meat eating among people 18 to 32 years of age. Similarly, the attitude that meat is tasty was found to be an important positive predictor of the consumption of various meats in a survey of residents of the United

* A paper based on this chapter has been published in *Appetite* (Lea, E., & Worsley, A. (2001). Influences on meat consumption in Australia. *Appetite*, 36(2), 127-136).

Kingdom by Richardson *et al.* (1993). In addition, Richardson *et al.* (1993) found that the healthiness of meat was a positive predictor of red meat consumption. Zey and McIntosh (1992) observed similar relationships for the intention to eat beef. Thus, it was hypothesised that meat appreciation and the healthiness (or necessity) of meat would be positive predictors of meat consumption (hypothesis 2.1a and hypothesis 2.1b, respectively; Chapter 2).

People may face barriers to changing their behaviour, such as when changing to a healthier diet (Cox *et al.*, 1998; Lappalainen *et al.*, 1997). It has been argued that it is only when the benefits of change outweigh the barriers that a change in behaviour occurs (McIntosh *et al.*, 1996; Rosenstock, 1974; Wolinsky, 1980). The influence of these factors on meat consumption was therefore examined, as this is likely to have wider implications for the adoption of plant-based diets generally. It was hypothesised that perceived barriers to vegetarian diets would be positive predictors of meat consumption (hypothesis 2.1c) but the perceived benefits of vegetarian diets would be negative predictors (hypothesis 2.2a).

Sources of health information, such as those communicated via the mass media, have strong effects on health behaviours and attitudes (Goldberg & Hellwig, 1997), particularly when the source is strongly trusted (Heesacker *et al.*, 1983; McGinnies, 1968). The interviews with vegetarians conducted by the candidate suggested that low- or non-meat-eaters rarely use or trust the mass media, advertising or orthodox health sources. Furthermore, research has found that vegetarians are more likely to be receptive to unorthodox sources of health information (Freeland-Graves, Greninger, Graves, & Young, 1986; Furnham & Forey, 1994; Hamilton, 1993). Therefore, it was

hypothesised that the use of and trust in the mass media, advertising and orthodox health sources would be positive predictors of meat consumption (hypothesis 2.1d), while use of and trust in unorthodox sources would be negative predictors (hypothesis 2.2b).

Sapp and Harrod (1989) and Zey and McIntosh (1992) found that significant others were a strong influence on intention to eat beef. Similarly, the diet of friends was a predictor of beef consumption in the study by Richardson *et al.* (1993). Therefore, it was hypothesised that the presence of vegetarian friends and family would be negative predictors of meat consumption (hypothesis 2.2c).

The presence of children in the household was expected to be a positive indicator, as parents tend to think meat is important for children's nutrition (Worsley, Baghurst, Skrzypiec, & Powis, 1993; Worsley & Skrzypiec, 1998a) (hypothesis 2.1e). It was considered likely that this would be a weak predictor however, as this was found to be the case by Worsley and Skrzypiec (1998a)

Personal values may influence food consumption (Feather, Norman, & Worsley, 1998; Lindeman & Stark, 1999), such as the consumption of a vegetarian or an omnivorous diet (Dietz *et al.*, 1995; Sims, 1978; Worsley *et al.*, 1995). It was hypothesised that values would be weak predictors only, however, as they do not influence behaviour directly, being more likely to influence beliefs and attitudes (Grunert *et al.*, 1993; Pollay & Gallagher, 1990) (part of hypotheses 2.1f and 2.2d). It was expected that power and tradition were likely to be positive predictors of meat consumption, after Adams (1990), Dietz *et al.* (1995) and Allen (2000), as introduced

in Chapter 1 (hypothesis 2.1f). Vegetarians are more likely to hold universal values such as concern about environmental issues and gender equity than non-vegetarians (Allen *et al.*, 2000; Dietz *et al.*, 1995; Worsley *et al.*, 1995). Therefore, it was predicted that universalism would be a negative predictor of meat consumption (hypothesis 2.2d).

Women are generally more health conscious than men (Fagerli & Wandel, 1999; Kemmer *et al.*, 1998; Warde & Hetherington, 1994), as are members of older age groups (Lester, 1994), and have been found to be more likely to select health as a major influence on their food choices (Lennernas *et al.*, 1997). It was predicted that women and members of older age groups would focus more on health factors than men and younger people (hypothesis 2.3).

Previous research by Worsley and Skrzypiec (1998a) found that demographic variables were not strong predictors of meat consumption, although the predicting variables for the separate regression analyses for men and women were different. This suggests that demographic variables are important directors of attitudes and consumption. Therefore, it was expected that although demographic variables would be likely to be weak predictors overall, different factors would be associated with meat consumption according to age and sex group (hypothesis 2.4). Presumably, there would also be different predictors of meat consumption according to current diet (vegetarian, non-vegetarian, or semi-vegetarian).

6.2 METHOD

Stepwise multiple regression analyses of the Meat Consumption Score (the sum of the responses to frequency of consumption of red and white meat, excluding fish and seafood) as the dependent variable were run with a number of predictor variables. The predictor variables were: factor scores derived from the principal component analyses, the demographic variables, respondents' recall of the promotion of meat and vegetarianism by information sources, beliefs about nutrition, and numbers of vegetarian family members and friends. Separate analyses were conducted among each age, sex and dietary group.

6.3 RESULTS

Almost three-quarters of the variance of the frequency of meat consumption was predicted by barriers to vegetarian diets, proportion of vegetarian friends and beliefs about meat (Table 6.1). The perceived barrier to vegetarianism factor *Vegetarianism Health Concerns and Appreciates Meat* (positive predictor accounting for 45.4% of the total variance) was the most important predictor.¹

Sex differences were important. Barriers to vegetarianism, particularly *Vegetarianism Health Concerns and Appreciates Meat* (positive predictor that explained 44.7% of the total variance among women), were the most important for women, with "proportion of vegetarian friends" (negative predictor) most important for men. Women were therefore more concerned with health than men.

¹ See Appendix 9 for the multiple regression analysis results for the random sample (i.e. general population). Note that the factors used as independent variables for the random sample regressions were obtained from principal components analyses conducted on the randomly selected sample only, and therefore differ slightly to those obtained from the pooled random and non-random samples. With regard to the predictors of frequency of meat consumption among the general population, the strongest

Some age group differences were apparent, particularly between the oldest group and the two youngest. Beliefs about meat were the main predictors for older people, with *Meat is a Necessary Dietary Component* and *Meat is Not Healthy* explaining 19.2% and 17.8% of the total variance respectively. *Vegetarianism Health Concerns and Appreciates Meat* was most important for the younger two groups, explaining 57.2% of the total variance among young people and 38.1% among the middle-aged group. Health concerns were important for all of the age groups, however. Over 80% of the variance of meat consumption was predicted for young people, which decreased to about 70% for the middle-aged group and about 55% for the oldest group.

There were strong differences between the dietary groups. A demographic variable, "live alone", was the strongest (negative) predictor for non-vegetarians, followed by *Red Meat Appreciation* (positive), and *Meat is Not Healthy* (negative). *Trust Advertising and Mass Media* was the best predictor for semi-vegetarians, with *Red Meat Appreciation* second, and *Lack of Knowledge and Convenience re Vegetarianism* third (all positive predictors). *Universal values* (negative) and *Meat is a Necessary Dietary Component* (positive) were the strongest predictors for vegetarians. More of the variance of meat consumption was accounted for among semi-vegetarians (67%) than among vegetarians or non-vegetarians, with similar amounts accounted for among each of the latter two groups (16% and 14% respectively).

predictors were *Red Meat Appreciation* (positive predictor), *Cost and Animal Welfare Concerns about Meat* (negative), and *Meat is a Necessary Dietary Component* (positive).

TABLE 6.1
Multiple regression analysis of frequency of meat consumption

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
ALL RESPONDENTS				
Vegetarianism health concerns and appreciates meat	0.33	0.08	***	45.4%
Proportion of vegetarian friends	-0.30	0.06	***	54.6%
Lack of knowledge and convenience re vegetarianism	0.35	0.05	***	59.3%
Meat is not healthy	-0.72	0.06	***	63.2%
Red meat appreciation	0.80	0.07	***	66.0%
Meat is a necessary dietary component	0.79	0.07	***	72.4%
<i>Constant</i>	<i>7.30</i>	<i>0.12</i>	***	
Final R square				72.4%
WOMEN				
Vegetarianism health concerns and appreciates meat	0.35	0.11	***	44.7%
Lack of knowledge and convenience re vegetarianism	0.34	0.07	***	52.3%
Meat is not healthy	-0.71	0.08	***	57.5%
Red meat appreciation	0.93	0.10	***	61.7%
Meat is a necessary dietary component	0.77	0.09	***	70.2%
Universal values	-0.30	0.08	**	71.5%
Number of children <18 years in household	0.14	0.06	*	72.0%
<i>Constant</i>	<i>6.80</i>	<i>0.08</i>	***	
Final R square				72.0%
MEN				
Proportion of vegetarian friends	-0.38	0.09	***	47.8%
Meat is a necessary dietary component	0.86	0.09	***	56.7%
Red meat appreciation	0.32	0.08	***	65.4%
Meat is not healthy	-0.68	0.08	***	74.6%
Lack of knowledge and convenience re vegetarianism	0.86	0.09	***	76.1%
Trust advertising and mass media	0.77	0.08	***	77.7%
<i>Constant</i>	<i>7.34</i>	<i>0.18</i>	***	
Final R square				77.7%
YOUNG PEOPLE				
Vegetarianism health concerns and appreciates meat	0.37	0.12	**	57.2%
Recall of the promotion of vegetarianism	-0.43	0.21	*	64.9%
Proportion of vegetarian friends	-0.20	0.08	*	69.2%
Lack of knowledge and convenience re vegetarianism	0.32	0.08	***	72.7%
Meat is not healthy	-0.68	0.09	***	74.6%
Meat is a necessary dietary component	0.73	0.10	***	76.4%
Red meat appreciation	0.79	0.11	***	81.0%
Number of children <18 years in household	0.24	0.06	***	82.2%
Recall of the promotion of meat	-0.53	0.19	**	82.9%
<i>Constant</i>	<i>7.23</i>	<i>0.23</i>	***	
Final R square				82.9%

[over]

TABLE 6.1 [continued]

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
MIDDLE-AGED PEOPLE				
Vegetarianism health concerns and appreciates meat	0.38	0.13	**	38.1%
Lack of knowledge and convenience re vegetarianism	0.46	0.09	***	47.3%
Red meat appreciation	0.93	0.11	***	53.3%
Meat is not healthy	-0.75	0.10	***	58.6%
Meat is a necessary dietary component	0.84	0.11	***	68.2%
<i>Constant</i>	<i>6.89</i>	<i>0.08</i>	<i>***</i>	
Final R square				68.2%
OLDER PEOPLE				
Meat is a necessary dietary component	0.93	0.11	***	19.2%
Meat is not healthy	-0.78	0.10	***	37.0%
Red meat appreciation	0.74	0.11	***	52.7%
Use social sources	0.29	0.10	**	55.1%
<i>Constant</i>	<i>7.02</i>	<i>0.10</i>	<i>***</i>	
Final R square				55.1%
NON-VEGETARIANS				
Live alone	-0.35	0.11	**	3.3%
Red meat appreciation	0.28	0.05	***	5.6%
Meat is not healthy	-0.27	0.06	***	8.2%
Meat is a necessary dietary component	0.21	0.06	***	11.0%
Use social sources	0.12	0.04	**	12.6%
Use mass media and advertising	0.11	0.04	**	13.8%
<i>Constant</i>	<i>7.56</i>	<i>0.06</i>	<i>***</i>	
Final R square				13.8%
SEMI-VEGETARIANS				
Trust advertising and mass media	0.53	0.20	**	22.8%
Red meat appreciation	0.80	0.32	*	44.8%
Lack of knowledge and convenience re vegetarianism	0.86	0.24	***	52.9%
Meat is not healthy	-0.65	0.24	**	60.3%
Traditional values	0.57	0.25	*	66.5%
<i>Constant</i>	<i>6.71</i>	<i>0.31</i>	<i>***</i>	
Final R square				66.5%
VEGETARIANS				
Universal values	-0.17	0.05	***	11.1%
Meat is a necessary dietary component	0.10	0.05	*	15.7%
<i>Constant</i>	<i>2.38</i>	<i>0.08</i>	<i>***</i>	
Final R square				15.7%

Analyses were based on groups of the following sizes: women $n = 395$, men $n = 304$; young people (15-37 years) $n = 237$, middle-aged people (38-53 years) $n = 227$, older people (54-91 years) $n = 226$; non-vegetarian $n = 546$, semi-vegetarian $n = 55$, vegetarian $n = 103$ (respondents identified their own dietary status).

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

6.4 DISCUSSION

The predictors in this study accounted for a uniquely high percentage of meat consumption (72.4% for all respondents). In comparison, other studies have generally predicted less than 30% of food consumption (Baranowski *et al.*, 1999). For example, between 12% and 18% of the variance of consumption of a variety of meats was

accounted for by attitudinal factors in the study by Richardson *et al.* (1993), while 29% of beef consumption was accounted for primarily by behavioural intentions and social acceptability in Sapp and Harrod's study (1989). Some exceptions include up to 37% of variance predicted for salads (Brug, Lechner, & De Vries, 1995) and up to 48% for types of milk (Tuorila-Ollikainen, 1987). About 32% of the variance of meat consumption was predicted by the random sample alone (see Appendix 9), which suggests that more of the factors associated with meat consumption (or lack of) are known for semi-vegetarians and, to a lesser extent, vegetarians than for the general population. This would correspond with the highest variance (82.9%) being predicted amongst the group of young people, which also had the highest proportion of vegetarians and semi-vegetarians (64% of the vegetarians and 43% of the semi-vegetarians were in the youngest age group). Overall therefore, level of prediction was good for the random sample and uniquely high for the pooled random and non-random samples.

Barriers to vegetarianism were the most important (positive) predictors of frequency of meat consumption for all respondents, women, and young and middle-aged people. For men, however, they were less important than "proportion of vegetarian friends" (negative predictor) and beliefs in meat (particularly the positive predictors *Meat is a Necessary Dietary Component* and *Red Meat Appreciation*), while for semi-vegetarians trust in advertising and mass media and appreciation of red meat (positive predictors) were more important than barriers. For older people, non-vegetarians, and vegetarians, barriers did not feature at all. *Meat is a Necessary Dietary Component* (positive predictor) and *Meat is Not Healthy* (negative) were the strongest predictors for older people. "Live alone" (negative) and *Red Meat Appreciation* (positive) were

the main predictors for non-vegetarians, while *Universal* values (negative) and *Meat is a Necessary Dietary Component* (positive) were the only predictors for vegetarians.

Vegetarianism Health Concerns and Appreciates Meat was the key predictor of frequency of meat consumption for all respondents in total and for women and most age groups. This partly concurs with the results of Worsley and Skrzypiec's (1998a) study of attitudes and meat consumption, in which meat appreciation was the key factor. Also in agreement with the latter were the results for non-vegetarians and semi-vegetarians, where *Red Meat Appreciation* was the second-ranked predictor. Thus, the results were in agreement with hypothesis 2.1a. The promotion of plant-based diets could benefit from more assertive marketing of meat substitutes ("fake meat") and an emphasis on the tastiness of plant-based foods (including how to prepare appetising plant-based meals).

The results also tended to agree with hypothesis 2.1b, particularly for older people, men and vegetarians, as the necessity of meat was a positive predictor of meat consumption. However, for all respondents, women, young and middle-aged people it was the perceived *unhealthiness* of vegetarian diets that was more important, rather than the perceived *healthiness* (or necessity) of meat. This suggests that an effective way to influence meat consumption may be to focus on the nutritional adequacy of plant-based diets (depending on the target audience), as well as the health aspects of meat.

Lack of knowledge about vegetarian eating and the perceived inconvenience of vegetarian diets were also found to be important influences on meat consumption,

especially for women and middle-aged people, and, to a lesser extent, semi-vegetarians (in accordance with hypothesis 2.1c). In other words, if people are unsure of how to prepare meat-free meals, perhaps because of lack of information or a perception that preparation of vegetarian meals is inconvenient, they are left with preparing meals that they know – ones which contain meat. Similarly, food preparation skills were found to be important dietary change indicators in an American study, where those respondents who were confident about being able to make healthy dietary changes were also those significantly more confident about being able to prepare meals without red meat (Contento & Murphy, 1990). In addition, the results of the current study suggest that if vegetarian food is not readily available when people eat out or shop, the lack of options means they are more likely to consume meat more frequently.

The presence of children in the household was, as expected, found to be a (weak) predictor (hypothesis 2.1e). However, it was only a predictor for women and young people. Women are often the main food providers for the household (Axelson, 1986; Kemmer *et al.*, 1998; Warde & Hetherington, 1994; Worsley & Worsley, 1989), which may be why the item was more important for women than for men. Its importance for young people (15-37 years) may indicate that it is mainly the presence of younger rather than older children in the household that is associated with meat consumption. This could be investigated in later research.

The role of personal values was generally weak, as predicted², with the notable exception being among vegetarians, where a values factor was the strongest predictor. Universal values were negative, weak predictors of meat consumption for women and strong predictors for vegetarians, as per hypothesis 2.2d, while traditional values were a weak, positive predictor among semi-vegetarians, as predicted (hypothesis 2.1f). It is possible that personal values are more relevant to the dietary behaviour of vegetarians than they are to non-vegetarians or semi-vegetarians. Universalism appears to be strongly associated with the choice of vegetarians not to eat meat.

The finding that *Power* was not a predictor of meat consumption (contrary to hypothesis 2) is discordant with studies such as that of Allen *et al.* (2000), which found that hierarchical dominance was associated with omnivorous diets. It is possible that statistical artefacts 'crowded out' some results in the present study. However, as discussed in Chapter 5, there were no statistically significant differences between non-vegetarians and vegetarians for two of the four items that loaded on this factor ("Authority" and "Social power"). (There were differences for "Wealth" and "Preserving my public image", however.) This may therefore be an immediate explanation for why *Power* did not predict meat consumption, but does not explain the lack of difference between the dietary groups on these two items. However, the results of the study by Dietz *et al.* (1995) were similar to those found by the present study in that the power-oriented factor they labelled "Self-enhancement" (formed of the items "Authority", "Social power", "Wealth" and "Influential") was not a predictor of the consumption of a vegetarian diet. It therefore appears that more work is

² Of note is that the results presented in later chapters (Chapters 7-10) support the possibility, discussed in section 6.1, that values are stronger predictors of beliefs than they are of behaviour, although in most cases other factors, particularly other beliefs, were still more important predictors than values.

required on the possibility of an association between meat consumption and power-oriented personal values, as the research results are conflicting.

In addition to the relative lack of overall importance of values, neither use of, nor trust in, information sources were important predictors of meat consumption for all of the groups, with the exception of semi-vegetarians, among whom trust in advertising and mass media was the strongest predictor (hypotheses 2.1d and 2.2b). Information sources are useful for conscious decision-making. It is possible that eating meat is largely habitual and therefore information sources are only weakly associated with meat consumption. Semi-vegetarians may present a special case as they may be unsure about the status of meat (as shown in Chapter 5), and thus may pay attention to food, health and nutrition information sources such as the media to try to resolve this situation. This result for semi-vegetarians also suggests that advertising and the mass media promote a positive image of meat. This will be discussed more fully in Chapter 11.

The impact of demographic variables in the regression equations was low (as it was in Worsley and Skrzypiec's (1998a) study), with the significant exception of "live alone" being the strongest (negative) predictor among non-vegetarians. A possible (partial) explanation may be the association between living alone and age ($r = 0.35$, $p < 0.001$).³ In the sample of non-vegetarians, 7%, 10% and 32% of those in the 15-37, 38-53 and 54-91 years age groups, respectively, lived alone. Elderly people tend to eat less (e.g. Quandt, Vitolins, DeWalt, & Roos, 1997) and this may include

³ Pearson's correlation coefficient (r) is a measure of a linear association between two variables. The sign (+ or -) indicates the direction of the association, while its absolute value indicates the strength. The value of the correlation coefficient can range from -1 to +1 (Hair *et al.*, 1995).

meat (e.g. Baghurst, 1999).⁴ One reason for this may be that the elderly find some foods, such as meat, difficult to chew or digest (Horwath, 1989; Locker, Clarke, & Payne, 2000; Quandt *et al.*, 1997; Schoenberg & Gilbert, 1998). Another explanation, relevant to all age groups, is that those who live alone may not wish to go to the effort of preparing meat dishes solely for themselves (e.g. see Arcury, Quandt, Bell, McDonald, & Vitolins, 1998; Worsley, 1988b). Mutual care may be important for those who cohabit and this may include the provision of meat dishes. However, a higher proportion of those non-vegetarians who lived alone believed that meat was disgusting ($p < 0.001$)⁵, that people had no right to kill animals ($p < 0.05$)⁶, and that red meat was expensive ($p < 0.05$)⁷, which suggests that there may also be other factors associated with their reduced meat consumption. This clearly requires further study.

When the respondents were split into sex and age groups, there were differences in the predictor factors (in accordance with hypothesis 2.4). It appears that men and women need to be considered separately in any attempt to influence frequency of meat consumption. In contrast to women, men were influenced more by their friends and beliefs about meat than by barriers to vegetarianism *per se*. It has been well documented that women are more health conscious than men (Fagerli & Wandel, 1999; Kemmer *et al.*, 1998; Warde & Hetherington, 1994) and this was also true for

⁴ There was a (weak) negative correlation between age and the Meat Consumptions Score among the non-vegetarians in the current study ($r = -0.16$, $p < 0.01$).

⁵ Lived alone - 6% agreed that meat was disgusting (13% unsure); Cohabiting - 2% agreed (4% unsure).

⁶ Lived alone - 11% agreed that humans had no right to kill animals (19% unsure); Cohabiting - 7% agreed (12% unsure).

⁷ Fifty-eight percent of non-vegetarians who lived alone believed that red meat was expensive (12% unsure) compared to 44% of those who did not live alone (12% unsure). This may indicate that this group of non-vegetarians had a lower income than those who did not live alone. (This may be a partial

the present study (hypothesis 2.3). Contrary to hypothesis 2.3, older people were not more concerned about health than the other age groups: *all* age groups had strong health concerns. The research that this hypothesis was based upon (e.g. Lester, 1994) was concerned with more general aspects of health rather than with meat consumption, which may explain the differing results. The age groups were, however, found to be concerned with *different aspects* of health. A perceived lack of iron and protein in vegetarian diets was a positive predictor of meat consumption for the two younger groups, whereas for older people it was the perceptions that: (1) meat is necessary in the diet in general; and (2) that it does not cause disease and is not fattening.

The more vegetarian friends respondents had, the less often meat was consumed, as predicted (hypothesis 2.2c). Indeed, for men, the presence of vegetarian friends was the main (negative) predictor of the frequency of meat consumption. Similarly, other studies have found the diet of significant others to be an influence on intention to eat beef (N. J. Richardson *et al.*, 1993; Sapp & Harrod, 1989; Zey & McIntosh, 1992). It is not yet clear whether vegetarians influence their meat-eating friends to decrease their meat consumption, or if people who eat little or no meat are more likely to become friends with people with similar meat consumption frequency. An early study of vegetarians by Dwyer *et al.* (1974) found that 36% of the study sample sought others on a similar diet, and 35% had many friends on similar diets, which agrees with the latter suggestion. This may occur because vegetarians hold different world-views to non-vegetarians (Sims, 1978) and because of the instrumental and emotional support provided by vegetarian friends (Jabs, Devine, & Sobal, 1998a). However, a

reflection of age.) Indeed, there was a significant negative correlation between living alone and

later small British study of student vegetarians is in agreement with the former possibility (i.e. that vegetarians influence their meat-eating friends to decrease their meat consumption) (Santos & Booth, 1996). It found that 8% of the vegetarian participants gave social influences as their primary reason for avoiding meat, while another 8% stated that this was a secondary or less important reason. Furthermore, 11% of partial meat-avoiders gave social influences as their primary reason, while another 7% stated that it was a non-primary reason (Santos & Booth, 1996). This suggests that vegetarians or low meat consumers may influence their meat-eating friends *and* gravitate towards those who are low- or no-meat consumers; however, further investigation is required.

Health-related beliefs about meat were important predictors of meat consumption, particularly for older people. The most important were that meat does not cause heart disease or cancer or is otherwise unhealthy and that meat is a necessary dietary component. Although it is likely that meat does not *cause* cancer or heart disease, there is evidence (reported in Chapter 1) that vegetarians have lower mortality from ischaemic heart disease. If the general population - particularly those in their mid-50s or older - was more aware of such research, perhaps meat consumption would be more susceptible to change. Also, health promotion campaigns that focus on whether meat is necessary for humans could be an important influence on meat consumption. This may be particularly so if they were directed predominantly at older people and men.

household income ($r = -0.34, p < 0.001$).

One possible limitation of the analyses was the Meat Consumption Score. It was a simple measure of frequency of red and white meat consumption, which in future work could be extended to include subcategories such as beef, pork, processed meat and poultry. The amount of meat eaten could be measured in greater detail to provide a more complete description of meat consumption. In addition, self-report may not be an entirely reliable indicator of actual behaviour (e.g. see Baranowski *et al.*, 1999). However, under the circumstances (time and financial limitations), it was necessary to have a simple self-report measure of frequency of meat intake for this study.

The present findings have important public health implications. Some of the barriers people raise against meat-free diets will also apply to plant-based diets generally. Plant-based diets are becoming more widely acknowledged as providing health benefits, including a decrease in the risk of particular diseases, as discussed in Chapter 1. The promotion of plant-based diets is desirable not only from a health perspective (e.g. American Dietetic Association, 1997c; Bingham, 1999; Dwyer, 1999; Potter, 2000; World Cancer Research Fund & American Institute for Cancer Research, 1997), but also from environmental and animal welfare perspectives (e.g. S. Lewis, 1994; Pimentel *et al.*, 1997; Singer, 1990).

6.4.1 Conclusion

A large proportion of the variance in the frequency of meat consumption was predicted by barriers to vegetarian diets, beliefs about meat, and the proportion of vegetarian friends. In addition, cohabitation, trust in advertising and mass media, and a lack of universal values were important for non-vegetarians, semi-vegetarians, and vegetarians, respectively. The analyses have highlighted the importance of taking

sex, age and dietary group into account when looking at predictors of frequency of meat eating, which in turn should be important when attempting to influence the consumption of plant-based diets. Ways to promote plant-based diets might include the provision of information about the nutritional adequacy and preparation of plant-based meals, more vegetarian-friendly shopping and dining environments, an emphasis on the tastiness of plant-based meals, and, possibly, the promotion of meat substitutes.

Chapter 7

THE FACTORS ASSOCIATED WITH THE BELIEF THAT MEAT IS NECESSARY

7.1 INTRODUCTION

Attitudes and beliefs about meat are important determinants of its consumption, as found in Chapter 6 (and see N. J. Richardson *et al.*, 1993; Worsley & Skrzypiec, 1998a). However, as well as examining the predictors of meat consumption, this thesis also aims to examine the social-cognitive origins of meat-related beliefs and attitudes, particularly health-related beliefs. Therefore, this chapter and the subsequent three chapters will examine the factors that may be associated with positive and negative beliefs about the healthiness of meat and of vegetarian diets (aim 3; Chapter 2). This chapter will examine the factors that may be associated with positive beliefs about the healthiness of meat.

The random population survey found that a large proportion of the South Australian population believe that it is necessary for humans to eat meat in order to maintain good health. For example, 64% of the random population sample believed that "Meat is necessary in the adult human diet"; 63% that it is necessary for children; 59% that "Meat is important for building strength" and 40% that "Meat is important for the health of babies and toddlers" (see Appendix 7; see Table 7.1 for the proportion of vegetarians, semi-vegetarians and non-vegetarians who agreed with these items). However, as discussed at the end of Chapter 1, research has shown that although meat is an important and convenient source of many nutrients, such as iron, it is generally not *necessary*; a well-planned vegetarian diet can provide adequate nutrition

(American Dietetic Association, 1997c). An examination of the factors that are associated with the widely held belief that meat is necessary may provide some insights into how this potential barrier to the consumption of plant-based diets can be overcome.

It was predicted (hypothesis 3; Chapter 2) that positive beliefs about the healthiness of meat - in this case, that meat is necessary - are positively associated with other positive health and non-health related beliefs about meat (in this case, *Red Meat Appreciation*) and perceived barriers to vegetarian diets (i.e. *Vegetarianism Health Concerns and Appreciates Meat, Lack of Knowledge and Convenience re Vegetarianism, Social Concerns about Vegetarianism, Social Influences Against Vegetarianism*), having fewer vegetarian significant others, use of and trust in mass media, advertising and orthodox sources of food, health and nutrition information, and holding more traditional and power-oriented values. Factors that were predicted to be negatively associated with the belief that meat is necessary, and that are not simply the converse of the above factors, are holding negative beliefs about meat (*Meat is Not Healthy*) and believing that there are benefits associated with vegetarianism (i.e. *Peace and Contentment Benefits of Vegetarianism, Health Benefits of Vegetarianism, Animal Welfare, Environmental and Hunger Benefits of Vegetarianism*), use of and trust in unorthodox food, health and nutrition information sources, and holding universal values. This hypothesis was based on (a) 'reasonable' expectations (e.g. that positive beliefs about meat would be positively related to perceived barriers to vegetarian diets) and (b) from what is known from research about the beliefs and behaviours of vegetarians and non-vegetarians (see Chapters 1 and 5) (e.g. Allen *et al.*, 2000; Dietz *et al.*, 1995; Freeland-Graves, Greninger, Graves, & Young, 1986; N.

J. Richardson *et al.*, 1993; Roos, Prättälä, & Koski, 2001; Worsley & Skrzypiec, 1998a), and therefore may also be expected to relate to certain beliefs about meat. This was necessary because there has been little research conducted on predictors of similar beliefs to the ones examined in this thesis. Thus, the analyses in this and the subsequent three chapters on the predictors of meat and vegetarianism beliefs (Chapters 7, 8, 9 and 10) may be considered to be largely exploratory.

7.2 METHOD

Stepwise multiple regression analyses of the *Meat is Necessary* belief score (see Table 7.1 for the four variables included in this score) were run with factor scores derived from principal component analyses on the various sections of the questionnaire, the demographic variables, respondents' recall of the promotion of meat and vegetarianism, beliefs about nutrition, and numbers or proportion of vegetarian family and friends. Regression analyses were conducted for all respondents in total and also for each dietary group.

TABLE 7.1
Description of the *Meat is Necessary* score, obtained by summing respondents' answers to the four variables, and the percentage of non-vegetarians, semi-vegetarians and vegetarians who agreed with the variables

VARIABLE	Non-veg.	Semi-veg.	Vegetarian	<i>p</i>
	% Agree (% Unsure)			
Meat is important for the health of babies and toddlers	42 (40)	21 (39)	2 (12)	***
Meat is necessary in children's diets	67 (25)	33 (31)	0 (11)	***
Meat is necessary in the adult human diet	68 (16)	19 (29)	1 (3)	***
Meat is important for building strength	62 (27)	19 (37)	5 (7)	***

For this and the following tables, analyses were based on dietary groups of the following sizes: non-vegetarian *n* = 546, semi-vegetarian *n* = 55, vegetarian *n* = 103 (respondents identified their own dietary status).

*** *p* < 0.001

The original *Meat is a Necessary Dietary Component* factor was not used as a dependent variable because its internal reliability, as measured by Cronbach's Alpha,

was deemed too low (0.22). Instead, only the first four items to load on the factor were used to form a *Meat is Necessary* belief score, as their internal reliability was high (0.90). In addition, restricting the score to these items simplified the interpretation, as they all pertained specifically to the belief that meat is necessary (the original factor, shown in Table 5.6, contained lower-loading items that were very diverse, including "I love to eat red meat such as beef, veal or lamb" and "I think meat is disgusting").

7.3 RESULTS

Almost 60% of the variance of *Meat is Necessary* was explained by *Vegetarianism Health Concerns and Appreciates Meat* (positive predictor), number of vegetarian significant others and perceived benefits of vegetarianism (all negative predictors). *Vegetarianism Health Concerns and Appreciates Meat* accounted for almost 50% of the total variance (Table 7.2).¹

The three dietary groups had strong differences in their predictors (Table 7.2). *Vegetarianism Health Concerns and Appreciates Meat* was the strongest predictor for non-vegetarians, followed by *Meat is Not Healthy* and *Enjoying a Healthy, Exciting Life* (all positive predictors). The first three predictors for semi-vegetarians were entirely different. *Animal Welfare, Environmental and Hunger Benefits of Vegetarianism* ranked first, with *Peace and Contentment Benefits of Vegetarianism* and *Red Meat Appreciation* second and third respectively (all negative predictors). For the vegetarians, *Red Meat Appreciation* was the strongest (negative) predictor,

¹ See Appendix 9 for the multiple regression results for the random population sample. The main (positive) predictors were *Health Concerns about Vegetarianism*, *Food Inadequacies of the Vegetarian*

followed by *Vegetarianism Health Concerns and Appreciates Meat* and *Lack of Knowledge and Convenience re Vegetarianism* (positive predictors). The predictive power of the various variables was low for non-vegetarians compared to semi-vegetarians and vegetarians (about 20% compared to over 60%).

TABLE 7.2
Multiple regression analysis of *Meat is Necessary*

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
ALL RESPONDENTS				
Vegetarianism health concerns and appreciates meat	1.73	0.15	***	47.5%
Proportion of vegetarian friends	-0.70	0.14	***	53.3%
Number of vegetarian family members	-1.02	0.22	***	55.7%
Animal welfare, environmental and hunger benefits of vegetarianism	-0.79	0.14	***	57.5%
Peace and contentment benefits of vegetarianism	-0.45	0.12	***	58.5%
<i>Constant</i>	14.32	0.26	***	
Final R square				58.5%
NON-VEGETARIANS				
Vegetarianism health concerns and appreciates meat	1.06	0.17	***	10.2%
Meat is not healthy	0.75	0.15	***	13.0%
Enjoying a healthy, exciting life values	0.44	0.13	***	15.1%
Animal welfare, environmental and hunger benefits of vegetarianism	-0.49	0.16	**	16.2%
Health benefits of vegetarianism	-0.34	0.13	**	17.6%
Red meat appreciation	-0.36	0.14	**	19.0%
<i>Constant</i>	13.93	0.14	***	
Final R square				19.0%
SEMI-VEGETARIANS				
Animal welfare, environmental and hunger benefits of vegetarianism	-1.59	0.36	***	35.2%
Peace and contentment benefits of vegetarianism	-1.03	0.33	**	49.4%
Red meat appreciation	-1.89	0.47	***	57.2%
Vegetarianism health concerns and appreciates meat	1.51	0.49	**	66.0%
<i>Constant</i>	11.25	0.44	***	
Final R square				66.0%
VEGETARIANS				
Red meat appreciation	-3.65	0.47	***	28.0%
Vegetarianism health concerns and appreciates meat	2.34	0.35	***	47.4%
Lack of knowledge and convenience re vegetarianism	0.70	0.25	**	52.6%
Social concerns about vegetarianism	0.64	0.22	**	55.2%
Meat is not healthy	0.60	0.20	**	58.0%
Use social sources	0.48	0.19	**	60.4%
Recall of the promotion of meat	-1.03	0.47	*	62.6%
<i>Constant</i>	6.31	0.83	***	
Final R square				62.6%

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Diet, and Against Dietary Change and Appreciates Meat. Appendix 11 lists results for the age and sex groups for the pooled random and non-randomly selected samples.

7.4 DISCUSSION

For all respondents, *Vegetarianism Health Concerns and Appreciates Meat* (positive association) and number of vegetarian significant others (negative associations) were the factors most strongly associated with the belief that meat is necessary. Varied results were obtained for the dietary groups. For non-vegetarians, *Vegetarianism Health Concerns and Appreciates Meat* (positive predictor) was also the most important, followed by the minor (positive) predictor *Meat is Not Healthy*. Benefits of vegetarianism were most important for semi-vegetarians, particularly *Animal Welfare, Environmental and Hunger Benefits of Vegetarianism*, followed by *Red Meat Appreciation* (all negative predictors), and by the positive predictor *Vegetarianism Health Concerns and Appreciates Meat*. *Red Meat Appreciation* (negative predictor) was most important for vegetarians, followed by barriers to vegetarianism, particularly *Vegetarianism Health Concerns and Appreciates Meat*. Thus, with the exceptions of *Meat is Not Healthy* and *Red Meat Appreciation* (both discussed below), the predictors were in the direction expected by hypothesis 3.

It is logical that people who believe that it is necessary to eat meat are concerned that meat-free diets are lacking in some nutrients, such as protein and iron. This association was strong for all respondents, non-vegetarians, and vegetarians. However, well-planned vegetarian diets usually contain adequate protein, iron and other nutrients (American Dietetic Association, 1997c). The misconception that vegetarian diets in general are nutritionally inadequate may need to be more strongly addressed by those who wish to promote plant-based diets.

As the number of vegetarian significant others decreased for all respondents in total, the belief that meat is necessary was more likely to be held. Vegetarians may serve as living examples to their friends and family of how a vegetarian diet *can* be healthy. The example of healthy vegetarians may more effectively convince consumers about the adequacy of - or even merits of - the vegetarian diet than any written information is able to.

The more that non-vegetarians believed that meat is necessary, the more they also believed that meat is unhealthy. At first this appears to be contradictory, and does not concur with hypothesis 3. However, the belief that meat is necessary in the diet does not rule out the view that *excessive* meat consumption may cause health problems. People who hold this view have two options: (1) to limit their meat consumption for health reasons, but not cut out meat completely (for health reasons); or (2) to continue eating meat without reducing consumption but to feel concerned about the possible detrimental health impact. Indeed, a recent study has shown that holding negative attitudes towards meat does not necessarily mean that meat consumption is decreased (Holm & Møhl, 2000), which supports the possibility of the latter option.

Enjoying a Healthy, Exciting Life was a minor predictor of *Meat is Necessary* for non-vegetarians; it was the only personal value that was a predictor for any of the *Meat is Necessary* regression analyses. The sensory aspects of foods, such as meat, may therefore be important to those non-vegetarians who believe it is essential for good health to eat meat. However, more research is required to confirm this because *Red Meat Appreciation* was a *negative* (albeit weak) predictor of this belief; although it is possible that white meats are preferred to red meats by those non-vegetarians who

believe meat is necessary. It is of interest that, for non-vegetarians, *Enjoying a Healthy, Exciting Life* was the only value predictor for any of the four sets of meat and vegetarianism beliefs (Chapters 7-10) and meat consumption (Chapter 6). It is possible that, for non-vegetarians, the other values are linked to quite different beliefs that were not measured in the questionnaire. For example, tradition may be linked to eating together.

The more that semi-vegetarians agreed with the belief that meat is necessary, the less they believed in animal welfare, environmental, peace and other such benefits of vegetarianism, and the less they appreciated red meat. This suggests that those semi-vegetarians who most strongly believed that meat is necessary had reduced their meat consumption more for taste and sensory reasons than for any perceived health or other benefits associated with vegetarianism. Indeed, it would be difficult to hold the belief that vegetarianism provides non-health benefits in conjunction with the belief that meat is necessary, because such benefits could then supposedly only be achieved at the high price of ill health for self and loved ones.

The few vegetarians who believed that meat is necessary (the proportion in agreement with the four variables ranged between 0 and 5%; see Table 7.1) were more likely than other vegetarians to have concerns with the healthiness of vegetarian diets but were less likely to appreciate red meat. This suggests that although these vegetarians appear to have diets that are inconsistent with their beliefs about the healthiness of such a diet, they are consistent in terms of taste reasons; it is likely that, similarly to the semi-vegetarian situation, they are vegetarian more because of a dislike of red meat rather than because of any beliefs that meat is unhealthy. They may need to

emphasise their dislike of meat to justify their non-meat-eating actions and simultaneously held beliefs that meat is necessary, in accordance with cognitive dissonance theory and balance theory (Festinger, 1957; Frey, 1986; Heider, 1944). Furthermore, it appears that their lack of knowledge about vegetarian diets may be a contributing factor to their belief that meat is necessary.

Future work could examine exactly how much meat people believe is necessary for health. For example, does some white or red meat need to be consumed daily, weekly, or perhaps only monthly to be healthy? If it is found that the majority of people believe that moderate to large servings of red or white meat should be consumed, say, at least five times a week, then this may present a problem for the promotion of plant-based diets, not just the vegetarian diet.

7.4.1 Conclusion

A number of factors were found to be strongly associated with the belief that meat is necessary, varying by dietary group. These were: (1) having concerns about the healthiness of vegetarianism (all respondents and dietary groups); (2) having few vegetarian significant others (all respondents); (3) believing that meat is unhealthy (non-vegetarians); (4) disagreeing that there are benefits associated with vegetarianism, particularly with regard to the environment, animal welfare, food production, peace and contentment (semi-vegetarians); (5) lack of red meat appreciation (vegetarians, semi-vegetarians); and (6) lack of knowledge about vegetarianism and a perception that vegetarian diets are inconvenient (vegetarians). Addressing the public's misconceptions about the nutritional adequacy of vegetarian diets, particularly with regard to iron and protein, may further the promotion of plant-

based diets. Furthermore, there appears to be some confusion on the part of non-vegetarians about whether meat is healthy or unhealthy; this clearly needs attention.

Chapter 8

THE FACTORS ASSOCIATED WITH HEALTH CONCERNS ABOUT VEGETARIAN DIETS AND MEAT APPRECIATION

8.1 INTRODUCTION

People often face barriers when they try to change their food consumption (Cox *et al.*, 1998; Lappalainen *et al.*, 1997). The barriers to plant-based diets, such as the vegetarian diet, need to be overcome before the benefits of plant-based diets can be obtained. The one health-related barrier to vegetarianism factor identified in this study was *Vegetarianism Health Concerns and Appreciates Meat*. To recapitulate, this factor contained items such as concern over lack of protein and iron in vegetarian diets, enjoyment of eating meat, and the belief that humans are "meant" to eat meat (see Table 5.8). About a quarter of non-vegetarians were concerned about protein and 29% about iron, with a similar number having other health concerns. About half agreed that humans are meant to eat meat and over 80% stated that they like eating meat (Table 5.8). This chapter will examine the factors associated with this set of beliefs (aim 3).

As per hypothesis 3 (Chapter 2), it was expected that the predictors of perceived health-related barriers to vegetarian diets (in this case, *Vegetarianism Health Concerns and Appreciates Meat*) would be other barriers to vegetarianism (i.e. *Lack of Knowledge and Convenience re Vegetarianism*, *Social Concerns about Vegetarianism*, and *Social Influences Against Vegetarianism*), positive beliefs about meat (*Meat is a Necessary Dietary Component* and *Red Meat Appreciation*), having fewer vegetarian significant others, use of and trust in mass media, advertising and

orthodox sources of food, health and nutrition information, and holding more traditional and power-oriented values. Factors that were predicted to be negatively associated with *Vegetarianism Health Concerns and Appreciates Meat*, and that are not simply the converse of the above factors, were holding negative beliefs about meat (*Meat is Not Healthy*) and the perception of benefits associated with vegetarian diets (*Peace and Contentment Benefits of Vegetarianism*, *Health Benefits of Vegetarianism*, and *Animal Welfare, Environmental and Hunger Benefits of Vegetarianism*), use of and trust in unorthodox information sources and holding universal values. As mentioned in the previous chapter, this hypothesis is exploratory, although it is based largely on what is known about the beliefs and behaviours of vegetarians and non-vegetarians and on previous research on the predictors of meat consumption (e.g. Allen *et al.*, 2000; Dietz *et al.*, 1995; Freeland-Graves, Greninger, Graves, & Young, 1986; N. J. Richardson *et al.*, 1993; Worsley & Skrzypiec, 1998a).

8.2 METHOD

Stepwise multiple regression analyses of the *Vegetarianism Health Concerns and Appreciates Meat* factor were run with factor scores derived from the principal component analyses, the demographic variables and the respondents' recall of promotion of meat and vegetarianism, beliefs about nutrition, and numbers or proportion of vegetarian family and friends. Regression analyses were conducted for all respondents in total and within each dietary group.

8.3 RESULTS

Beliefs about meat were important predictors of *Vegetarianism Health Concerns and Appreciates Meat* for all respondents (Table 8.1). *Meat is a Necessary Dietary Component* was the best (positive) predictor for all respondents, accounting for almost 30% of the variance, followed by *Red Meat Appreciation* and the negative predictor *Meat is Not Healthy*. In total, about 63% of the variance of *Vegetarianism Health Concerns and Appreciates Meat* was accounted for by meat beliefs and other barriers to vegetarianism.¹

Lack of Knowledge and Convenience re Vegetarianism (negative) was the most important predictor for non-vegetarians, followed by the positive predictors *Red Meat Appreciation* and *Meat is a Necessary Dietary Component*. Other barriers to vegetarianism, being male, and trust in information source factors were less important. About 30% of the variance of *Vegetarianism Health Concerns and Appreciates Meat* was accounted for by all of the previously mentioned factors.

Personal values were the most important (positive) predictors for semi-vegetarians, with *Power* values ranking first and *Security and Conformity* values second. *Trust Unorthodox Sources* was the final (negative) predictor. Just over 50% of variance was accounted for by these factors.

¹ See Appendix 9 for the multiple regression results for the random population sample. The main (positive) predictors were *Meat is a Necessary Dietary Component* and *Red Meat Appreciation*. Appendix 11 lists results for the age and sex groups for the pooled random and non-randomly selected samples.

TABLE 8.1
Multiple regression analysis of *Vegetarianism Health Concerns and Appreciates Meat*

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
ALL RESPONDENTS				
Meat is a necessary dietary component	0.56	0.03	***	28.2%
Red meat appreciation	0.54	0.03	***	53.0%
Meat is not healthy	-0.24	0.03	***	59.7%
Lack of knowledge and convenience re vegetarianism	-0.12	0.03	***	61.0%
Social concerns about vegetarianism	-0.12	0.03	***	62.0%
Social influences against vegetarianism	-0.09	0.03	***	62.9%
<i>Constant</i>	-0.05	0.03	NS	
Final R square				62.9%
NON-VEGETARIANS				
Lack of knowledge and convenience re vegetarianism	-0.19	0.03	***	6.9%
Red meat appreciation	0.37	0.04	***	12.4%
Meat is a necessary dietary component	0.30	0.04	***	20.7%
Social concerns about vegetarianism	-0.13	0.04	***	24.3%
Social influences against vegetarianism	-0.11	0.03	**	26.4%
Trust orthodox sources	0.11	0.04	**	27.6%
Male	-0.21	0.07	**	28.8%
Trust unorthodox sources	-0.09	0.04	**	29.9%
<i>Constant</i>	0.44	0.11	***	
Final R square				29.9%
SEMI-VEGETARIANS				
Power values	0.42	0.10	***	24.2%
Security and conformity values	0.34	0.10	***	40.9%
Trust unorthodox sources	-0.30	0.12	**	51.6%
<i>Constant</i>	-0.58	0.10	***	
Final R square				51.6%
VEGETARIANS				
Meat is a necessary dietary component	0.52	0.06	***	15.8%
Social influences against vegetarianism	-0.12	0.04	**	26.2%
Social concerns about vegetarianism	0.18	0.05	***	32.2%
Red meat appreciation	0.73	0.13	***	39.4%
Meat is not healthy	-0.22	0.05	***	50.9%
Lack of knowledge and convenience re vegetarianism	-0.16	0.06	**	54.8%
<i>Constant</i>	-0.03	0.21	NS	
Final R square				54.8%

*** $p < 0.001$, ** $p < 0.01$

Beliefs about meat and barriers to vegetarianism accounted for about 55% of the variance of *Vegetarianism Health Concerns and Appreciates Meat* for vegetarians. *Meat is a Necessary Dietary Component* was the strongest (positive) predictor, followed by *Social Influences Against Vegetarianism* (negative), *Social Concerns about Vegetarianism* (positive), *Red Meat Appreciation* (positive) and *Meat is Not*

Healthy (negative). *Lack of Knowledge and Convenience re Vegetarianism* was the final (negative) predictor for vegetarians.

8.4 DISCUSSION

Overall, beliefs about meat, particularly *Meat is a Necessary Dietary Component* and *Red Meat Appreciation* (positive), and barriers to vegetarianism, such as *Lack of Knowledge and Convenience re Vegetarianism* and *Social Influences Against Vegetarianism* (negative predictors), were the most important predictors of *Vegetarianism Health Concerns and Appreciates Meat* for all respondents, non-vegetarians and vegetarians. Personal values were most important for semi-vegetarians. The predictors of *Vegetarianism Health Concerns and Appreciates Meat* were generally in the direction expected by hypothesis 3. The notable exception was that, in most cases, the non-health related perceived barriers to vegetarian diets (*Lack of Knowledge and Convenience re Vegetarianism*, *Social Influences Against Vegetarianism* and *Social Concerns about Vegetarianism*) were *negative* predictors, not positive. This suggests the presence of a division between health and non-health related barriers to the consumption of a vegetarian diet.

A stronger focus on the nutritional adequacy of appropriately planned meatless diets is required. It is important, however, to concentrate on vegetarian and plant-based meals in general being appetising as well as healthy. This is because *Red Meat Appreciation* was - as might be expected - positively associated with *Vegetarianism Health Concerns and Appreciates Meat*.

Interesting differences were found between the dietary groups. For non-vegetarians it appears that those who have health concerns about vegetarian diets either believe that (a) they have enough knowledge about vegetarianism or (b) it is easy to become vegetarian without learning any specific information about the diet (i.e. knowledge and so on is not necessary to become vegetarian). These alternatives are of some concern. With regards to the first possibility, most non-vegetarians are unlikely to be knowledgeable about vegetarianism, or they would not be worried about lack of iron or protein, but would understand that, provided vegetarian diets are well-planned, these nutrients should be present in sufficient quantities. As to the second alternative, it *is* important to seek out information about healthy vegetarian eating if a vegetarian diet is to be health promoting.

Values were the most important predictors for semi-vegetarians. Semi-vegetarians may still be unsure about the health status of meat, and therefore personal values may be a useful guide for their beliefs. Those semi-vegetarians who held *Power* and *Security and Conformity* values also had health concerns about vegetarian diets and appreciated meat. Power-oriented values were expected to positively predict positive meat beliefs and perceived barriers to vegetarianism. This was because previous research has suggested that non-vegetarians are more likely than vegetarians to support hierarchical domination (e.g. Allen *et al.*, 2000; Worsley *et al.*, 1995; Worsley & Skrzypiec, 1997) (see page 14, Chapter 1). Security and conformity, particularly when combined with power-oriented values, emphasise the protection or control of harmony and order in relations and the avoidance or overcoming of the threat of uncertainties (Schwartz, 1992). Thus, for people who hold such values, consuming a vegetarian diet may represent an unnecessary health risk for themselves or their

family. However, a high meat intake may represent an equally large health risk to these individuals and therefore a compromise of moderate meat consumption (semi-vegetarianism) is reached.

Although, apart from a couple of exceptions, all the vegetarians had a negative score for *Vegetarianism Health Concerns and Appreciates Meat*, those who were less strongly negative believed (or at least did not disagree as vehemently as other vegetarians) that meat is important for some age-groups. Thus, even some people who are following a vegetarian diet may require some reassurance about the nutritional adequacy of planned vegetarian diets at all stages of life.

8.4.1 Conclusion

Consumers have concerns about the healthiness of vegetarian diets. These concerns are linked to their appreciation of meat but are not positively associated with non-health related barriers to eating a vegetarian diet. Information about the nutritional adequacy of vegetarian diets and on the preparation of appetising meatless meals is required if consumers are to adopt plant-based diets at a greater rate than at present. However, this may be problematic as the results suggest that non-vegetarians who have health concerns about vegetarianism would be reluctant to accept such information. It is possible that a more practical approach may need to be taken. For example, incremental dietary change may be a successful strategy. This perceived barrier to the consumption of a vegetarian diet requires further investigation.

Chapter 9

THE FACTORS ASSOCIATED WITH THE BELIEF THAT MEAT IS UNHEALTHY*

9.1 INTRODUCTION

Meat is a controversial food: it may be considered to provide health benefits or to be detrimental to one's health, often depending on the amount consumed. Red meat provides B-vitamins, minerals and protein, and in this way may contribute positively to the diet (Sanders, 1999). However, recent nutritional recommendations suggest that only limited amounts of (low-fat) meat (no more than 80 to 100 grams per day) should be consumed (National Health and Medical Research Council, 1992; US Department of Health and Human Services, 2000; World Cancer Research Fund & American Institute for Cancer Research, 1997).

As has been discussed in Chapter 1, compared to meat-centred diets, plant-based diets contain less saturated fat, animal protein and cholesterol, and are higher in folate, fibre, antioxidants, phytochemicals and carotenoids (American Dietetic Association, 1997c; Bingham, 1999). People who choose not to eat any meat have lower mean body-mass, lower total plasma cholesterol concentrations, and substantially lower mortality from ischaemic heart disease (Key, Davey *et al.*, 1999; Key, Fraser *et al.*, 1999). All-cause mortality rates are also lower. For example, the Oxford Vegetarian Study found that the ratio for all cause mortality for vegetarians compared with meat-

* A paper based on this chapter has been published in *Public Health Nutrition* (Lea, E., & Worsley, A. (2002). The cognitive contexts of beliefs about the healthiness of meat. *Public Health Nutrition*, 5(1), 37-45).

eaters was 0.80, after adjusting for smoking, social class and body-mass index (Appleby *et al*, 1999) .

Diets low in meat may entail the risk of not meeting the needs for some nutrients, particularly iron, zinc, and vitamin B-12 (Dwyer, 1991; Mann, 2000). However, despite mean serum ferritin levels being lower, clinical anaemia does not appear to be more common in those who consume no meat than among omnivores (Alexander *et al.*, 1994; Mann, 2000), at least in Western countries (Dwyer, 1988). With regard to zinc, a recent Australian study found that lacto-ovo-vegetarians did not have a significantly greater risk of low zinc status than omnivores, although female vegetarians had a lower daily zinc intake than female omnivores (Ball & Ackland, 2000).

Consumers are not always presented with accurate dietary information with which they can make a balanced judgement of the healthiness of food-stuffs such as meat. Furthermore, even if they were, consumers are influenced by other factors in addition to knowledge. This chapter will examine the factors that predict negative beliefs about the healthiness of meat (aim 3; Chapter 2).

The score *Meat is Unhealthy* forms the basis for this analysis. It was obtained from the sum of respondents' level of agreement with four statements: (1) "Meat causes heart disease"; (2) "Meat causes cancer"; (3) "Red meat such as beef or lamb is fattening"; and (4) "Meat such as beef and lamb is unhealthy to eat" (see Table 9.1). These statements were derived from a factor analysis of a larger number of beliefs about meat, as discussed in Chapter 5. These four beliefs are specifically about

perceptions of the intrinsic unhealthiness of meat that tend to be unsupported by the scientific literature. For example, studies have shown that non-meat-eating is *associated* with a decreased risk of heart disease (e.g. Key, Davey *et al.*, 1999; Key, Fraser *et al.*, 1999), but it is unlikely that meat *causes* heart disease. Instead, because of the emphasis on consumption of fruits, vegetables and wholegrains, vegetarians may consume a diet lower in saturated fat by eating fewer fatty foods from sources other than meat, such as cakes and fried foods.¹ Nonetheless, consumers' perceptions are relevant for both the promoters of meat and of plant-based diets. They offer important insights into consumers' attitudes about meat.

TABLE 9.1
Description of the *Meat is Unhealthy* score, obtained by summing respondents' answers to the four variables, and the percentage of non-vegetarians, semi-vegetarians and vegetarians who agreed with the variables

MEAT IS UNHEALTHY	Non-veg.	Semi-veg.	Vegetarian	<i>p</i>
	% Agree (% Unsure)			
Meat causes heart disease	7 (35)	28 (39)	55 (8)	***
Meat causes cancer	2 (35)	19 (48)	46 (37)	***
Red meat such as beef or lamb is fattening	11 (15)	20 (28)	46 (28)	***
Meat such as beef and lamb is unhealthy to eat	3 (9)	19 (25)	64 (13)	***

*** $p < 0.001$

As per hypothesis 3, it was predicted that negative beliefs about the healthiness of meat (i.e. *Meat is Unhealthy*) would be positively associated with the belief that there are health and non-health benefits associated with vegetarian diets (*Peace and Contentment Benefits of Vegetarianism*, *Health Benefits of Vegetarianism*, and *Animal Welfare, Environmental and Hunger Benefits of Vegetarianism*), use of and trust in unorthodox information sources, and holding universal values. Factors that were predicted to be negatively associated with *Meat is Unhealthy*, and that are not simply the converse of the above factors, were holding positive beliefs about meat (*Red Meat*

¹ This is only one possible explanation of why non-meat-eating is associated with a decreased risk of

Appreciation and Meat is a Necessary Dietary Component), perceived barriers to vegetarianism (*Vegetarianism Health Concerns and Appreciates Meat, Lack of Knowledge and Convenience re Vegetarianism, Social Concerns about Vegetarianism, and Social Influences Against Vegetarianism*), having fewer vegetarian significant others, use of and trust in mass media, advertising and orthodox sources of food, health and nutrition information, and holding more traditional and power-oriented values.

9.2 METHOD

The *Meat is Unhealthy* score was comprised of the first four items that loaded on to the *Meat is Not Healthy* factor, discussed in Chapter 5 (Table 5.6). This factor consisted of the four *Meat is Unhealthy* beliefs, each with factor loadings of .66 and over, and a number of other non-health related items, with factor loadings of .53 and under. The four *Meat is Unhealthy* beliefs were summed together for use as a dependent variable because (a) they were the highest loading items on the factor, noticeably higher than the fifth and lower items; (b) together had high internal reliability (Cronbach Alpha of 0.85); and (c) formed an easily interpretable set of beliefs.

Stepwise multiple regression analyses of the *Meat is Unhealthy* score were run with factor scores derived from the principal component analyses, the demographic variables, the respondents' recall of the promotion of meat and vegetarianism, beliefs about nutrition, and numbers of vegetarian friends and family. Regression analyses were also conducted within each dietary group.

heart disease.

9.3 RESULTS

Overall, about half of the variance of the *Meat is Unhealthy* score was predicted by perceived benefits of vegetarian diets, being male, and, by the presence of vegetarian family members (Table 9.2). The benefits of vegetarianism factor scores, particularly *Peace and Contentment Benefits of Vegetarianism* (16.3% of the total variance), were the most important.²

There were strong differences between the dietary groups (Table 9.2). *Social Concerns about Vegetarianism* (positive predictor) ranked first for non-vegetarians. This particular barrier to vegetarianism factor consisted predominantly of beliefs held by respondents that they would be stereotyped negatively, thought of as a "wimp" or not "macho" enough, or feel conspicuous among others if they were to become vegetarian, and an unwillingness to eat unusual foods. *Health Benefits of Vegetarianism* ranked second, followed by the other benefits (all positive predictors).

"Income" was the strongest (negative) predictor for semi-vegetarians, followed by *Universal* values (positive predictor). *Universal* is a personal values factor composed of items such as "Unity with nature", "A world of beauty", "Protecting the environment" and "Equality".

More of the variance of *Meat is Unhealthy* (64%) was explained among the vegetarian group than among any other dietary group or all respondents considered together. *Red Meat Appreciation* (enjoyment of eating meat) ranked first for vegetarians, with

² See Appendix 9 for the multiple regression results for the random population sample. *Cost and Animal Welfare Concerns about Meat*, *Health Benefits of Vegetarianism*, and *Spiritual, Peace and*

Health Benefits of Vegetarianism second (both positive predictors) and "education" third (negative predictor).

TABLE 9.2
Multiple regression analysis of *Meat is Unhealthy*

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
ALL RESPONDENTS				
Peace and contentment benefits of vegetarianism	1.34	0.11	***	16.3%
Animal welfare, environmental and hunger benefits of vegetarianism	1.24	0.11	***	31.3%
Health benefits of vegetarianism	1.08	0.10	***	42.5%
Male	1.10	0.21	***	45.1%
Number of vegetarian family members	0.80	0.19	***	46.5%
<i>Constant</i>	7.74	0.32	***	
Final R square				46.5%
NON-VEGETARIANS				
Social concerns about vegetarianism	0.47	0.13	***	6.3%
Health benefits of vegetarianism	0.66	0.11	***	11.6%
Animal welfare, environmental and hunger benefits of vegetarianism	0.69	0.15	***	14.1%
Peace and contentment benefits of vegetarianism	0.72	0.14	***	17.9%
Male	0.89	0.23	**	19.6%
"Diet is important in preventing illness and disease"	0.51	0.16	***	21.3%
Recall of the promotion of meat	-0.88	0.24	***	22.9%
Recall of the promotion of vegetarianism	0.69	0.26	**	24.2%
<i>Constant</i>	5.79	0.82	***	
Final R square				24.2%
SEMI-VEGETARIANS				
Income	-1.15	0.35	**	20.9%
Universal values	1.49	0.46	**	37.5%
<i>Constant</i>	13.12	0.99	***	
Final R square				37.5%
VEGETARIANS				
Red meat appreciation	4.73	0.65	***	40.6%
Health benefits of vegetarianism	1.34	0.36	***	49.9%
Education	-1.01	0.31	***	55.5%
Trust specialised media	-0.79	0.30	**	59.2%
Number of vegetarian family members	0.65	0.29	*	61.6%
Recall of the promotion of meat	1.70	0.76	*	64.0%
<i>Constant</i>	22.39	1.77	***	
Final R square				64.0%

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Contentment Benefits of Vegetarianism were the strongest (positive) predictors. Appendix 11 lists

9.4 DISCUSSION

For all respondents in total, the benefits of vegetarianism, particularly non-health benefits, were most strongly related to the belief that meat is unhealthy, but the factors associated with this belief differed according to dietary group. For non-vegetarians, social concerns about vegetarianism were most important, followed by health and non-health benefits of vegetarianism. Income (negative) and universal values were the only predictors for semi-vegetarians, while for vegetarians, red meat appreciation, health benefits and education (negative) were the strongest predictors. The predictors were generally in the expected direction (hypothesis 3), with the exceptions of *Social Concerns about Vegetarianism* and *Red Meat Appreciation*, which were *positive* predictors for non-vegetarians and vegetarians, respectively (discussed below).

Although the majority of the South Australian population does not believe that meat is unhealthy (Table 9.1 above and Table 4 in Appendix 7), a significant minority does appear to hold this belief. For example, 11% of non-vegetarians believed that red meat is fattening, while 7% of non-vegetarians believed that meat causes heart disease. Recent research originating from Denmark and the United Kingdom has also found that some meat-eaters consider meat to be unhealthy, particularly as it is considered to be fattening (Holm & Møhl, 2000; Povey *et al.*, 2001). The factors associated with the belief that meat is unhealthy should be of interest to those who wish to promote meat, meat-free diets, or plant-based diets that include some meat.

For all the respondents, the perceived benefits of consuming a vegetarian diet were important positive predictors of *Meat is Unhealthy*, as predicted (hypothesis 3), with

results for the age and sex groups for the pooled random and non-randomly selected samples.

Peace and Contentment Benefits of Vegetarianism being the key factor. This factor is quite diverse. It includes items that represent improved equality between the sexes, reduced aggression, religious and spiritual benefits, as well as increased dietary enjoyment, improved health, and improvement of the environment. The results also show a strong positive association between beliefs about the unhealthiness of meat and concern for animal welfare, food-production efficiency and the environment. Thus, the interaction between the health and non-health issues surrounding plant-based diets is important.

Health Benefits of Vegetarianism was also an important predictor of *Meat is Unhealthy*, particularly for the non-vegetarian and vegetarian groups. If the consumption of a vegetarian diet is thought to decrease fat intake, prevent disease and improve health in general, it is logical that it would be associated with the factor that includes such beliefs as eating meat increases fat intake and disease.

Social issues were also important for the non-vegetarian group, for whom *Social Concerns about Vegetarianism* was the strongest - and a positive - predictor. It was not expected that barriers to the adoption of vegetarianism would be *positively* associated with the belief that meat is unhealthy (hypothesis 3). One explanation could be that those who believe meat is unhealthy need justification for their meat-eating behaviour. This accords with cognitive dissonance theory and balance theory, which suggest that people may alter their beliefs in order to justify their behaviour (Festinger, 1957; Frey, 1986; Heider, 1944). Alternatively, perhaps it simply highlights the strength of the social barriers to vegetarianism for many people: even

when meat is believed to be unhealthy, dietary change may not occur unless social and other issues are overcome.

At first glance, it appears odd that *Red Meat Appreciation* was a positive predictor of *Meat is Unhealthy* for vegetarians. This group, apart from two people, all had negative scores for *Red Meat Appreciation*. Thus, as vegetarians become less strongly negative about meat appreciation, the more they agree that meat is intrinsically unhealthy. One explanation is that the mildly negative people may need more justification for their non-meat-eating actions, in accordance with cognitive dissonance theory and balance theory (Festinger, 1957; Frey, 1986; Heider, 1944). Thus, these people may be vegetarian more for health reasons than because of any strong dislike of eating meat. A longitudinal study is required to assess the likelihood of this being the case for vegetarians.

It is worthy of note that income and education were negative predictors of *Meat is Unhealthy* for semi-vegetarians and vegetarians, respectively. Apart from the less important predictor of being male (for all respondents and for non-vegetarians, discussed below), these were the only demographic variables that were predictors. Nutrition knowledge generally increases with higher education and income levels (Parmenter, Waller, & Wardle, 2000; Variyam, Blaylock, & Smallwood, 1996). Probably people with higher nutrition knowledge are less likely to agree that meat *causes* cancer or heart disease and/or may see some health benefits of eating meat despite their personal low or nil meat consumption. The more highly educated vegetarian and higher income semi-vegetarian respondents may have reasons for their dietary behaviour other than a perception that meat is unhealthy. They may

emphasise the health benefits of plant-based diets rather than the negative health effects of meat, or they may be semi-vegetarian or vegetarian for environmental, animal welfare or other non-health reasons. Clearly this finding requires further investigation. In particular, a sample of vegetarians with more varying education levels should be examined, as the vegetarians in this study were highly educated (74% were university-educated, 4% had a technical or trade certificate, and a further 18% had completed high school).

It is interesting that being male was a positive (albeit weak) predictor of *Meat is Unhealthy* for non-vegetarians and when all respondents were considered together. Significantly more non-vegetarian men than women believed that red meat is fattening (12% vs. 10%; $p < 0.01$) and that meat causes heart disease (8% vs. 6%; $p < 0.05$) and cancer (4% vs. 1%; $p < 0.05$).³ It is possible that men are more likely to believe that meat causes heart disease and cancer and is fattening because men are more likely to be overweight and obese and to die from cardiovascular disease and cancers (Australian Bureau of Statistics, 1997, 2001c), and they perceive themselves at risk partly because they eat meat. This is an issue that certainly requires additional investigation.

The present findings have important public health implications. Negative beliefs about the healthiness of meat were associated with perceived benefits of vegetarianism and social concerns about vegetarianism. The benefits included not only health benefits, but also environmental, animal welfare, peace and contentment

³ These p -values for differences *between* the sexes are not shown elsewhere in this thesis, although Appendix 10 provides the results of cross-tabulations by dietary group and sex and the p -values for differences between dietary groups *within* each sex.

benefits. Plant-based diets are becoming more widely acknowledged as providing health benefits, including decreases in the risk of particular diseases (Key, Davey *et al.*, 1999; Key, Fraser *et al.*, 1999). However, the misconceptions held by some consumers that meat is the (or a) *cause* of such diseases needs to be overcome. More accurate information about the positive attributes of meat and of the benefits of plant-based diets is required, but in the context of the broader issues that surround meat. Future research could examine the nature and accuracy of the available information about meat from a variety of sources, to determine where change is needed.

9.4.1 Conclusion

Negative beliefs about the health aspects of meat were found to be linked predominantly to the perceived benefits of vegetarianism for all respondents in total and, to a lesser extent, non-vegetarians and vegetarians. For non-vegetarians it was social concerns about vegetarianism and perceived health benefits that were most important, while for vegetarians it was red meat appreciation and health benefits of vegetarianism that were important. To influence meat consumption via beliefs about the healthiness of meat it is important to address social, environmental, animal welfare, peace and contentment issues as well as health.

Chapter 10

THE FACTORS ASSOCIATED WITH THE BELIEF THAT VEGETARIAN DIETS PROVIDE HEALTH BENEFITS

10.1 INTRODUCTION

This chapter will examine the factors associated with the one principal components factor that was directly related to perceived health benefits of vegetarian diets, namely, *Health Benefits of Vegetarianism* (aim 3; Chapter 2). This factor contained benefits of vegetarianism items such as disease prevention, decreased saturated fat intake, increased weight control, maintenance of one's health, and improved life expectancy (see Table 5.10). Many respondents believed that there are health benefits associated with vegetarian diets, particularly eating greater quantities of fruit and vegetables and consuming less saturated fat, but also with regard to disease prevention, weight control and staying healthy in general (see Table 5.10 and Appendix 7). It is particularly important to examine such beliefs as many of the perceived benefits of vegetarian diet items also pertain to broader plant-based diets.

As per hypothesis 3, it was predicted that perceived health benefits of vegetarian diets would be positively associated with non-health related benefits of such diets (i.e. *Peace and Contentment Benefits of Vegetarianism* and *Animal Welfare, Environmental and Hunger Benefits of Vegetarianism*), with negative beliefs about meat (i.e. *Meat is Not Healthy*), use of and trust in unorthodox information sources, and holding universal values. Factors that were predicted to be negatively associated with *Health Benefits of Vegetarianism*, and that are not simply the converse of the above factors, were positive beliefs about meat (*Red Meat Appreciation* and *Meat is a*

Necessary Dietary Component), perceived barriers to vegetarian diets (*Vegetarianism Health Concerns and Appreciates Meat, Lack of Knowledge and Convenience re Vegetarianism, Social Concerns about Vegetarianism, and Social Influences Against Vegetarianism*), having fewer vegetarian friends and family members, use of and trust in advertising, mass media and orthodox sources of food, health and nutrition information, and holding more traditional and power-oriented values.

There is one existing study that directly pertains to the examination of the factors linked to the perception that there are health benefits associated with the vegetarian diet. Kalof and others (1999) examined the demographic and personal value predictors of the statement: "I believe a vegetarian diet is generally more healthy than a diet that includes red meat". They found that being a black American and holding universal values were positive predictors of this belief, while holding traditional values was a negative predictor. This study therefore strengthened the expectation that the hypothesis would be fulfilled with regard to traditional and universal values.

10.2 METHOD

Stepwise multiple regression analyses of *Health Benefits of Vegetarianism* were run with factor scores derived from the principal component analyses, the demographic variables, the respondents' recall of the promotion of meat and vegetarianism, beliefs about nutrition, and numbers or proportion of vegetarian family and friends. Regression analyses were conducted for all respondents in total and within each dietary group.

10.3 RESULTS

About a third of the variance of *Health Benefits of Vegetarianism* was predicted by a variety of factors (Table 10.1). *Meat is Not Healthy* was the most important (positive) predictor, followed by *Meat is a Necessary Dietary Component* (negative), and the statement: "I frequently look for information on healthy eating" (positive). Non-health-related benefits of vegetarianism were also (negative) predictors, as were *Red Meat Appreciation* (negative) and *Lack of Knowledge and Convenience re Vegetarianism* (positive).¹

There were strong differences between the three dietary groups, although the strongest predictor for semi-vegetarians and for vegetarians was the same (Table 10.1). *Lack of Knowledge and Convenience re Vegetarianism* (positive predictor) was most important for non-vegetarians, followed by the statements "I do not need to make any changes to the food I eat as it is already healthy enough" (negative) and "I frequently look for information on healthy eating" (positive). In total, about 25% of the variance of *Health Benefits of Vegetarianism* was accounted for among non-vegetarians. In contrast, almost 40% of variance was accounted for among semi-vegetarians and over 50% for vegetarians. *Meat is Not Healthy* (positive) ranked first for semi-vegetarians and vegetarians. *Moderate and Successful values* (positive) ranked second for semi-vegetarians, and, finally, being Anglo-Australian (positive). *Vegetarianism Health Concerns and Appreciates Meat* was the second strongest (negative) predictor for vegetarians, followed by "Diet is important in preventing illness and disease" (positive).

¹ Appendix 9 reports the multiple regression results for the random population sample. The strongest predictors were *Against Dietary Change and Appreciates Meat* (negative predictor) and *Lack of*

TABLE 10.1
Multiple regression analysis of *Health Benefits of Vegetarianism*

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
ALL RESPONDENTS				
Meat is not healthy	0.51	0.04	***	7.4%
Meat is a necessary dietary component	-0.46	0.04	***	11.0%
"I frequently look for information on healthy eating"	0.17	0.03	***	14.0%
Peace and contentment benefits of vegetarianism	-0.38	0.05	***	17.8%
Animal welfare, environmental and hunger benefits of vegetarianism	-0.44	0.05	***	23.9%
Red meat appreciation	-0.30	0.04	***	29.5%
Lack of knowledge and convenience re vegetarianism	0.14	0.04	***	31.2%
<i>Constant</i>	-0.62	0.13	***	
Final R square				31.2%
NON-VEGETARIANS				
Lack of knowledge and convenience re vegetarianism	0.19	0.05	***	6.2%
"I do not need to make any changes to the food I eat as it is already healthy enough"	-0.14	0.04	***	8.6%
"I frequently look for information on healthy eating"	0.22	0.04	***	11.5%
Animal welfare, environmental and hunger benefits of vegetarianism	-0.35	0.06	***	14.3%
Peace and contentment benefits of vegetarianism	-0.30	0.05	***	17.3%
Meat is not healthy	0.32	0.06	***	21.1%
Meat is a necessary dietary component	-0.24	0.06	***	24.2%
<i>Constant</i>	-0.54	0.19	**	
Final R square				24.2%
SEMI-VEGETARIANS				
Meat is not healthy	0.47	0.13	***	19.7%
Moderate and successful values	0.41	0.14	**	29.4%
Anglo-Australian	0.63	0.28	*	38.2%
<i>Constant</i>	-0.23	0.23	NS	
Final R square				38.2%
VEGETARIANS				
Meat is not healthy	0.32	0.07	***	15.9%
Vegetarianism health concerns and appreciates meat	-0.42	0.12	***	22.4%
"Diet is important in preventing illness and disease"	0.32	0.12	**	28.3%
"I do not need to make any changes to the food I eat as it is already healthy enough"	0.16	0.06	**	32.8%
Peace and contentment benefits of vegetarianism	-0.40	0.09	***	39.1%
Animal welfare, environmental and hunger benefits of vegetarianism	-0.37	0.11	***	45.8%
Traditional values	0.19	0.07	**	50.9%
<i>Constant</i>	-1.56	0.70	*	
Final R square				50.9%

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Knowledge and Convenience re Vegetarianism (positive predictor). Appendix 11 lists results for the age and sex groups for the pooled random and non-randomly selected samples.

10.4 DISCUSSION

For all respondents, the belief that meat is neither healthy nor necessary and frequent searching for information on healthy eating were the main predictors of *Health Benefits of Vegetarianism*. However, there were differences between the dietary groups, as discussed below. In particular, health issues were relatively more important for semi-vegetarians and vegetarians, while knowledge and convenience issues were most important for non-vegetarians. There were unexpected differences in the direction of some of the predictors, contrary to hypothesis 3. These were: (1) the perceived non-health benefits of vegetarianism (*Peace and Contentment Benefits of Vegetarianism* and *Animal Welfare, Environmental and Hunger Benefits of Vegetarianism*) were *negative* predictors of *Health Benefits of Vegetarianism*, while (2) the barrier to vegetarianism, *Lack of Knowledge and Convenience re Vegetarianism*, was a *positive* predictor. These are discussed below.

Health beliefs were the strongest predictors of *Health Benefits of Vegetarianism* for all respondents, semi-vegetarians and vegetarians, particularly the belief that meat is unhealthy. The latter included items about meat causing cancer and heart disease, being fattening, and generally unhealthy, while the perceived health benefits consisted predominantly of disease prevention, decreased fat intake, weight control and being healthy in general. Therefore, this association is logical, as is the negative association with the belief that meat is necessary for health in the diet (an important predictor for all respondents and a weak predictor for non-vegetarians) and with health concerns about vegetarianism (a strong negative predictor for vegetarians).

For non-vegetarians, the strongest predictors were a lack of knowledge about vegetarian diets and a perception that they are inconvenient, and the belief that they needed to improve the healthiness of their diet. Thus, the provision of information about how to prepare easy, fast and healthy meat-free meals could help them to achieve a more plant-based diet. Specific meal plans and grocery lists could be provided, as a way to increase the effectiveness of the information. One study, with the aim of achieving weight loss through diet, found that this method was as effective as providing subjects with low-fat meals (Wing *et al.*, 1996). Meal plans provided structure and reduced the perceived difficulty of planning healthy meals, while grocery lists ensured more appropriate purchases were made at the supermarket (Wing *et al.*, 1996). Providing such information is particularly likely to be effective, as the non-vegetarians who perceive vegetarian diets to have health benefits already search for information on healthy eating and believe that their diet needs to change.

Non-health related benefits of vegetarianism were *negatively* associated with perceived health benefits for all respondents, non-vegetarians, and vegetarians (although they were not particularly strong predictors). At first, this seems to contradict the previous finding that non-health related issues and benefits of vegetarianism were *positively* associated with the *Meat is Unhealthy* score for all respondents and non-vegetarians (Chapter 9). However, because the perception that there are health benefits associated with vegetarianism is not necessarily anti-meat, that is, some of these benefits could be obtained from a plant-based diet that contains some meat (e.g. eating more fruits, vegetables and plant foods in general can decrease the risk of heart disease, and a reduction in meat intake can help to decrease saturated fat intake), this could make sense. It may mean that people can see health benefits

associated with vegetarianism but not necessarily think meat is ethically "bad" (e.g. with respect to the environment or animal welfare), whereas those who believe that meat itself is unhealthy are likely to hold ethical concerns about this food. However, *Meat is Not Healthy* is a positive predictor of *Health Benefits of Vegetarianism* for non-vegetarians and vegetarians (and also semi-vegetarians), so this explanation may not hold. Clearly, further confirmation and examination of these associations is required, perhaps via qualitative analyses and/or a longitudinal survey.

Values were important only for semi-vegetarians, although they were weak predictors for vegetarians. *Moderate and Successful* values were positively associated with perceived health benefits of vegetarian diets for semi-vegetarians. It is possible that this group is not vegetarian, despite their belief in the health benefits of such diets, because they extend their avoidance of "extreme" feelings and actions into their dietary behaviour (i.e. vegetarianism may be seen as extreme, while semi-vegetarianism may be viewed as a more moderate compromise that obtains some of the health benefits associated with vegetarian diets). Semi-vegetarians may feel they have achieved one of their personal goals to improve the healthiness of their diet by their decreased (moderate) meat consumption.

Traditional values being a positive, albeit weak, predictor of the belief that meat is unhealthy for vegetarians was unexpected. Tradition had been hypothesised to be a negative predictor of positive beliefs about vegetarianism/negative beliefs about meat. Certainly, this was found to be so in the study of Kalof and others (1999), although the study was based on one health benefit item only for a randomly selected sample. These differences may also be due to the greater number of tradition-oriented items

used in Kalof's study; there were nine items on the tradition-oriented factor, whereas there were four in the current study. Indeed, the personal values measured by the current survey were a shortened version of Schwartz's (1992) inventory of values. Thus, it is possible that the values results are an artefact of this. Alternatively, the finding that tradition-oriented values were (weakly) linked to *Health Benefits of Vegetarianism* for vegetarians suggests that these vegetarians may belong to a background or culture of vegetarianism where such a diet is considered to be traditional. That is, tradition-oriented values are not always related to patriarchal, hierarchical, meat-eating cultures, but to more egalitarian, vegetarian cultures. These personal value findings clearly require further investigation.

10.4.1 Conclusion

Many South Australians perceive that health benefits are associated with eating a vegetarian diet, which may also apply to plant-based diets in general. However, if non-vegetarians are to obtain some of the health benefits associated with the consumption of a plant-based diet, they require information on the preparation of quick and easy plant-based meals.

Chapter II

THE INFORMATION SOURCE FACTORS ASSOCIATED WITH MEAT CONSUMPTION AND HEALTH-RELATED BELIEFS ABOUT MEAT AND VEGETARIANISM*

11.1 INTRODUCTION

There is a multitude of information sources in the modern world. Messages communicated via the mass media can have an important role in belief and attitude formation or reinforcement (McIntosh & Guseman, 1985). Indeed, as discussed in Chapter 1, the media have strong effects on both health attitudes and behaviours. It is vital, then, that accurate messages that allow people to take positive steps towards improving their diet are conveyed (Goldberg & Hellwig, 1997; Radimer & Harvey, 1995), but more understanding is required of the manner in which information influences beliefs, attitudes and behaviour in day-to-day food choices (de Almeida *et al.*, 1997).

Information sources are only one type of influence on people's behaviours and perceptions about food, but they are important because they can be utilised for health promotion purposes: particular information can be directed towards specific groups from the appropriate information sources. This contrasts with the influence of demography, significant others and personal values (among other factors), which are less susceptible to rapid change. This chapter examines the likely impact of information sources on frequency of meat consumption and the four sets of health-

* A paper based on part of this chapter has been accepted for publication in *Ecology of Food and Nutrition* (Lea, E., & Worsley, A. Are information sources associated with Australians' beliefs about the necessity of meat?).

related beliefs about meat and vegetarianism. Both the use of and trust in information sources are examined.

There is a growing debate about the relative values of meat-based and plant-based meals (the issues involved in this have been discussed in Chapter 1). There are three alternatives that are commonly advanced by various health and industry interests: (1) the promotion of meat-free diets (vegetarianism); (2) the promotion of meat; and (3) the promotion of plant-based diets that include some meat (see World Cancer Research Fund & American Institute for Cancer Research, 1997). Information sources are actively involved in this debate. Therefore, the decision was made to evaluate the influence of various sources on the population's meat consumption and beliefs about meat and vegetarianism.

Thus, the aim of this chapter is to examine the relationship between the reported use of and trust in food, health and nutrition information sources on meat consumption and the four sets of beliefs about the healthiness of meat and vegetarianism (encompassed by aims 2 and 3 in Chapter 2).

11.1.1 Use of information sources

Much research has been conducted on the information sources utilised for health and nutrition information by the general population, as discussed in Chapter 1 (Begley & Cardwell, 1996; de Almeida *et al.*, 1997; Falk *et al.*, 2001; Kunkel *et al.*, 1986; Lambert-Lagace, 1983; McIntosh *et al.*, n.d.; Novascone & Hertzler, 1986; O'Keefe *et al.*, 1998; Radimer & Harvey, 1995; Rakowski *et al.*, 1990; Reilly, 1985; K. M. Richardson *et al.*, 1998). For example, a Queensland (Australia) study found that

magazine articles were the source of nutrition information found useful by the highest percentage of survey participants, followed by food labels, television shows, National Heart Foundation information, and books (Radimer & Harvey, 1995). In a pilot study conducted by Richardson *et al.* (1998), the most accessible sources of nutrition information were brochures, pamphlets, Internet sites, magazines and newspapers.

The interviews conducted with vegetarians suggested that low- or non-meat-eaters who hold negative beliefs about meat rarely use the mass media, advertising or orthodox health sources (such as doctors and the National Heart Foundation) for food, health or nutrition information. The participants were more likely to use unorthodox sources of information such as alternative/complementary health practitioners, vegetarian magazines and health food shops/staff. This confirmed previous research where a link was found between alternative diets (such as vegetarian and red meat avoidance diets) and other forms of alternativism (such as the use of alternative/complementary therapies and health magazines) (Hamilton, 1993). Therefore it was hypothesised that (a) use of the mass media, advertising and orthodox health sources would be positive predictors of meat consumption and beliefs that meat is healthy and vegetarian diets are unhealthy (hypotheses 2.1d and 3.1c), while (b) the use of unorthodox sources would be a negative predictor of meat consumption and beliefs that meat is healthy and vegetarian diets are unhealthy (hypotheses 2.2b and 3.2b).

11.1.2 Trust in information sources

Information that emanates from a respected source is generally given greater attention by consumers (Heesacker *et al.*, 1983; McGinnies, 1968). One study found that

members of the United Kingdom Vegetarian Society trusted information on meat published by the Society more than the general population did, while the latter trusted the Meat and Livestock Commission and government leaflets more highly (N. J. Richardson, Shepherd *et al.*, 1994). Similarly, an earlier study found that American vegetarians appeared to mistrust traditional institutions such as the American Medical Association and the government more than non-vegetarians did (Freeland-Graves, Greninger, Graves, & Young, 1986).¹ Thus, vegetarians and others like them who do not believe that meat is a necessary dietary component may be less likely to trust orthodox sources, as such sources may be more likely to promote meat as part of a healthy diet. They may be more likely to trust vegetarian magazines and other unorthodox sources. It follows then that trust in orthodox sources may be a positive predictor of meat consumption and beliefs that meat is healthy and vegetarian diets are unhealthy (hypotheses 2.1d and 3.1c), while trust in unorthodox sources may be a negative predictor (hypotheses 2.2b and 3.2b).

11.2 METHOD

Stepwise multiple regression analyses of the Meat Consumption Score, *Meat is Necessary* belief score, *Vegetarianism Health Concerns and Appreciates Meat*, the *Meat is Unhealthy* belief score, and *Health Benefits of Vegetarianism* (as dependent variables) were each run with factor scores derived from the information sources principal component analyses (as independent variables). Regression analyses were also conducted within each dietary group.

¹ Note that this American survey was not specifically on trust; the apparent lower level of trust in such sources by vegetarians was garnered by the candidate from differences between vegetarians and non-vegetarians in response to statements such as "One should visit a doctor when he is ill", "The government is hiding the truth about laetrile" and "The American Medical Association contributes to our health and well being" (Freeland-Graves, Greninger, Graves, & Young, 1986).

11.3 RESULTS

11.3.1 Meat consumption

Just under half of the variance of frequency of meat consumption for all respondents was accounted for by use of and trust in information sources (Table 11.1). *Use Unorthodox Sources* was the strongest (negative) predictor, followed by *Trust Orthodox Sources* and *Trust Advertising and Mass Media* (both positive predictors) (Table 11.1).²

Use Social Sources and *Use Mass Media and Advertising* (positive predictors) accounted for 3.4% of the variance of consumption among non-vegetarians. In contrast, over 30% of variance was accounted for among semi-vegetarians, by *Trust Advertising and Mass Media* (positive predictor) and *Use Unorthodox Sources* (negative predictor). For self-identified vegetarians, *Use Specialised Media B* (positive; use articles in sports and science magazines, and teachers, school and higher education) and *Trust Specialised Media* (negative; trust articles in science, vegetarian and health magazines, books, and radio programs) were the information source predictors of meat consumption (Table 11.1).

² See Appendix 9 for the multiple regression results for the random population sample. *Trust Advertising and Mass Media* and *Trust Orthodox Sources* were the main (positive) predictors.

TABLE 11.1
Multiple regression analysis of frequency of meat consumption, with information sources as predictors

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
ALL RESPONDENTS				
Use unorthodox sources	-0.65	0.10	***	27.3%
Trust orthodox sources	0.57	0.09	***	35.5%
Trust advertising and mass media	0.49	0.09	***	42.8%
Trust unorthodox sources	-0.34	0.08	***	44.5%
Trust specialised media	-0.29	0.08	***	46.5%
Use mass media and advertising	0.27	0.08	***	47.3%
Use orthodox sources	0.24	0.08	**	48.0%
Use specialised media a	0.21	0.08	**	48.6%
<i>Constant</i>	6.78	0.06	***	
Final R square				48.6%
NON-VEGETARIANS				
Use social sources	0.14	0.04	***	2.4%
Use mass media and advertising	0.10	0.04	*	3.4%
<i>Constant</i>	7.69	0.04	***	
Final R square				3.4%
SEMI-VEGETARIANS				
Trust advertising and mass media	0.58	0.24	*	22.8%
Use unorthodox sources	-0.60	0.26	*	32.9%
<i>Constant</i>	6.29	0.30	***	
Final R square				32.9%
VEGETARIANS				
Use specialised media b	0.12	0.04	**	6.7%
Trust specialised media	-0.09	0.04	*	12.1%
<i>Constant</i>	2.09	0.04	***	
Final R square				12.1%

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

11.3.2 The belief that meat is necessary

Over 40% of the variance of the belief that *Meat is Necessary* was predicted by use of and trust in various information sources for all respondents (Table 11.2). *Use Unorthodox Sources* (negative predictor) was the most important (accounting for 22.8% of the total variance), followed by the positive predictor *Trust Orthodox Sources* (about 8% of the total variance).³

Appendix 11 lists results for the age and sex groups for the pooled random and non-randomly selected samples.

³ Appendix 9 displays the multiple regression results for the random population sample. The strongest (positive) predictors were *Trust Advertising and Mass Media* and *Trust Orthodox Sources*. Appendix 11 lists results for the age and sex groups for the pooled random and non-randomly selected samples.

About 15% of the variance of *Meat is Necessary* was predicted for semi-vegetarians, with less than 10% predicted for non-vegetarians and vegetarians (Table 11.2). *Trust Advertising and Mass Media* was the only (positive) predictor for semi-vegetarians and the most important for non-vegetarians, followed by *Trust Social Sources* and other trust predictors. *Use Social Sources* (positive predictor) was the only predictor for self-identified vegetarians.

TABLE 11.2
Multiple regression analysis of *Meat is Necessary*, with information sources as predictors

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
ALL RESPONDENTS				
Use unorthodox sources	-0.83	0.18	***	22.8%
Trust orthodox sources	1.20	0.16	***	31.0%
Trust advertising and mass media	1.21	0.15	***	37.9%
Trust unorthodox sources	-0.71	0.16	***	40.0%
Trust specialised media	-0.43	0.14	**	41.2%
Trust social sources	0.43	0.14	**	42.2%
Use orthodox sources	0.43	0.16	**	43.0%
Constant	12.76	0.12	***	
Final R square				43.0%
NON-VEGETARIANS				
Trust advertising and mass media	0.54	0.15	***	1.7%
Trust social sources	0.35	0.13	**	3.1%
Trust orthodox sources	0.47	0.16	**	4.6%
Trust unorthodox sources	-0.32	0.13	*	5.9%
Constant	13.97	0.14	***	
Final R square				5.9%
SEMI-VEGETARIANS				
Trust advertising and mass media	1.04	0.40	**	15.3%
Constant	11.10	0.48	***	
Final R square				15.3%
VEGETARIANS				
Use social sources	0.82	0.26	**	9.6%
Constant	5.80	0.24	***	
Final R square				9.6%

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

11.3.3 Health concerns about vegetarian diets and meat appreciation

Over one-third of the variance of *Vegetarianism Health Concerns and Appreciates Meat* was explained by information source variables (Table 11.3). *Use Unorthodox Sources* was the most important (negative) predictor for all respondents, followed by

Trust Orthodox Sources (positive predictor). *Trust Advertising and Mass Media* (positive), *Trust Unorthodox Sources* (negative) and *Use Specialised Media B* (negative) were the remaining, more minor predictors.⁴

TABLE 11.3
Multiple regression analysis of *Vegetarianism Health Concerns and Appreciates Meat*, with information sources as predictors

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
ALL RESPONDENTS				
Use unorthodox sources	-0.23	0.05	***	23.1%
Trust orthodox sources	0.29	0.04	***	29.0%
Trust advertising and mass media	0.22	0.04	***	32.4%
Trust unorthodox sources	-0.23	0.04	***	36.4%
Use specialised media b	-0.11	0.04	**	37.5%
<i>Constant</i>	-0.05	0.03	NS	
Final R square				37.5%
NON-VEGETARIANS				
Trust unorthodox sources	-0.15	0.04	***	3.1%
Use social sources	0.10	0.04	**	5.0%
<i>Constant</i>	0.31	0.04	***	
Final R square				5.0%
SEMI-VEGETARIANS				
Trust unorthodox sources	-0.37	0.14	**	12.4%
Use orthodox sources	0.31	0.12	*	25.4%
<i>Constant</i>	-0.51	0.12	***	
Final R square				25.4%
VEGETARIANS				
Trust unorthodox sources	-0.15	0.06	**	7.0%
Use social sources	0.14	0.06	*	13.1%
<i>Constant</i>	-1.38	0.06	***	
Final R square				13.1%

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

The three dietary groups had almost identical predictors (Table 11.3). *Trust Unorthodox Sources* (negative) ranked first for all groups. *Use Social Sources* ranked second for non-vegetarians and vegetarians, while *Use Orthodox Sources* was second for semi-vegetarians (both positive predictors). More variance was predicted among

⁴ See Appendix 9 for the multiple regression results for the random population sample. *Use Social Sources* (positive) and *Trust Unorthodox Sources* (negative) were the two strongest predictors. Appendix 11 lists results for the age and sex groups for the pooled random and non-randomly selected samples.

the semi-vegetarian group than among the other dietary groups (25.4% for semi-vegetarians compared with 13.1% for vegetarians and 5.0% for non-vegetarians).

11.3.4 The belief that meat is unhealthy

A quarter of the variance of the *Meat is Unhealthy* score was explained by information source variables (Table 11.4). *Use Unorthodox Sources* was the most important (positive) predictor for all respondents, followed by the negative predictor *Trust Orthodox Sources*. *Trust Unorthodox Sources* (positive) and *Trust Advertising and Mass Media* (negative) ranked third and fourth respectively, but were relatively weak predictors.⁵

TABLE 11.4
Multiple regression analysis of *Meat is Unhealthy*, with information sources as predictors

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
ALL RESPONDENTS				
Use unorthodox sources	0.49	0.17	**	13.7%
Trust orthodox sources	-0.99	0.14	***	19.8%
Trust unorthodox sources	0.72	0.15	***	22.3%
Trust advertising and mass media	-0.67	0.14	***	25.6%
Constant	9.51	0.12	***	
Final R square				25.6%
NON-VEGETARIANS				
Trust unorthodox sources	0.36	0.12	**	1.9%
Constant	8.58	0.12	***	
Final R square				1.9%
SEMI-VEGETARIANS				
Trust advertising and mass media	-1.00	0.40	*	14.6%
Constant	10.82	0.48	***	
Final R square				14.6%
VEGETARIANS				
Trust orthodox sources	-1.24	0.36	***	11.6%
Trust unorthodox sources	0.93	0.43	*	16.2%
Constant	12.38	0.58	***	
Final R square				16.2%

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

⁵ See Appendix 9 for the multiple regression analysis results for the random population sample. *Trust Unorthodox Sources* (positive) and *Trust Advertising and Mass Media* (negative) were the main predictors. Appendix 11 lists results for the age and sex groups for the pooled random and non-randomly selected samples.

There were strong dietary group differences (Table 11.4). *Trust Unorthodox Sources* (positive) was the only predictor for non-vegetarians. For semi-vegetarians, *Trust Advertising and Mass Media* was the only (negative) predictor; while for vegetarians, *Trust Orthodox Sources* (negative) ranked first, followed by *Trust Unorthodox Sources* (positive). Only about 2% of the variance of *Meat is Unhealthy* was explained among non-vegetarians, whereas about 15% was accounted for among semi-vegetarians and vegetarians.

11.3.5 Perceived health benefits of vegetarian diets

Use of and trust in unorthodox sources predicted over 6% of the variance of *Health Benefits of Vegetarianism* for all respondents (positive predictors), with use being most important (Table 11.5).⁶

TABLE 11.5
Multiple regression analysis of *Health Benefits of Vegetarianism*, with information sources as predictors

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
ALL RESPONDENTS				
Use unorthodox sources	0.17	0.05	***	5.1%
Trust unorthodox sources	0.13	0.05	**	6.4%
Constant	-0.01	0.04	NS	
Final R square				6.4%
NON-VEGETARIANS				
Trust unorthodox sources	0.15	0.05	**	3.0%
Trust orthodox sources	0.16	0.06	**	5.0%
Constant	-0.15	0.05	**	
Final R square				5.0%
SEMI-VEGETARIANS				
NO PREDICTORS				
VEGETARIANS				
NO PREDICTORS				

*** $p < 0.001$, ** $p < 0.01$

⁶ Appendix 9 gives the multiple regression results for the random population sample. *Use Orthodox Sources* and *Trust Unorthodox Sources* were the only (positive) predictors. Appendix 11 lists results for the age and sex groups for the pooled random and non-randomly selected samples.

For non-vegetarians, trust in both unorthodox and orthodox sources predicted 5% of the variance (both positive predictors). There were no information source predictors for either semi-vegetarians or vegetarians (Table 11.5).

11.4 DISCUSSION

It was found that use of and trust in food, health and nutrition information sources are associated with meat consumption and health-related meat and vegetarianism beliefs. The most important sources overall were orthodox and unorthodox sources, advertising, the mass media, and social sources.

The predictors of meat consumption and positive beliefs about the healthiness of meat/negative beliefs about the healthiness of vegetarian diets were: (a) lack of use of and trust in unorthodox sources, (b) use of and trust in orthodox sources, (c) use of and trust in social sources, (d) use of and trust in advertising and mass media, (e) use of certain kinds of specialised media, and (f) lack of trust in specialised media. Predictors of negative beliefs about meat/positive beliefs about vegetarian diets were: (a) use of and trust in unorthodox sources, (b) lack of trust in orthodox sources, (c) trust in orthodox sources, and (d) lack of trust in advertising and mass media. Therefore, the hypotheses were supported, since use of and trust in mass media, advertising and orthodox sources were positive predictors of meat consumption and the beliefs that meat is healthy and vegetarian diets are unhealthy (hypotheses 2.1d and 3.1c), while use of and trust in unorthodox sources were negative predictors of meat consumption and beliefs that meat is healthy and vegetarian diets are unhealthy (hypotheses 2.2b and 3.2b).

There were some differences between the dietary groups with regard to the information sources associated with meat consumption and some of the meat and vegetarianism beliefs. The most striking difference was that use of or trust in mass media and advertising was not a predictor of meat consumption or any meat or vegetarianism belief for vegetarians, whereas these sources were predictors for both non-vegetarians and semi-vegetarians. Therefore, it seems possible that the communication of messages via mass media or advertising would not influence the beliefs or behaviour of vegetarians. However, specialised media such as sports and science magazines may perhaps be utilised to influence the behaviour of vegetarians. These sources were not predictors of behaviour or beliefs for non-vegetarians or semi-vegetarians. The differences found, such as this one, emphasise the link between use of and trust in information sources and the varying subcultures (different practices, beliefs and communication patterns) of vegetarians, semi-vegetarians, and non-vegetarians. With regard to similarities between the dietary groups, orthodox and unorthodox sources and social sources were predictors for all three groups for various beliefs.

Unorthodox sources such as alternative health practitioners, vegetarian magazines and health food shops/staff are less likely to be positive about the inclusion of meat in the diet compared with orthodox sources. Use of and trust in unorthodox sources was negatively associated with meat consumption and positive meat beliefs/negative vegetarianism beliefs, and positively associated with negative meat beliefs/positive vegetarianism beliefs, as hypothesised. This concurs with previous research that found a link between vegetarianism and use of unorthodox sources in that a disproportionate number of vegetarians use such sources (Hamilton, 1993). However,

it is not known if some of these sources (e.g. alternative health practitioners and health food shops/staff) actively promote the belief that meat is unhealthy. Research needs to be conducted to examine the information provided by these sources on vegetarianism and meat eating. For example, one question that could be answered is whether or not they actually promote the belief that meat causes heart disease and cancer (since trust in and use of unorthodox sources were found to be positive predictors of *Meat is Unhealthy*). It is possible that the information provided by such sources may emphasise the health benefits of vegetarian diets or plant foods, or perhaps only point out an *association* between meat and certain diseases, and people misconstrue this information to mean that meat *causes* cancer or heart disease or is otherwise intrinsically unhealthy. Until further research is conducted it is not known whether people who hold beliefs that meat is unhealthy are simply more likely to use and trust such sources (which there is some evidence for), or if it is these sources that are influencing the beliefs of the people that use and trust them. This may have some implications for influencing dietary beliefs and behavioural change. If balanced, science-based information that highlights the move by some orthodox organisations (such as the World Cancer Research Fund and American Institute for Cancer Research) towards plant-based diets was to be published or promoted by such unorthodox sources, perhaps these unorthodox sources may become more acceptable to the general public. Alternatively, such a scheme may simply reinforce their beliefs about such sources, and they may remain with or turn to those orthodox sources that do not yet actively promote plant-based diets. That is, the perceived scientific validity, or lack of, with regard to unorthodox sources may not be the problem, but rather the ideas and beliefs that they promote. The promotion of unorthodox sources in the form they are in now simply in order to try and decrease concerns about

vegetarianism would be detrimental in the long term, as the information provided by such sources may not always be scientifically accurate (e.g. the eat right for your blood type diet).

Health professionals are generally regarded as major influences on the public's opinion about food. The role of orthodox health sources, such as doctors, the National Heart Foundation and the Anti-Cancer Foundation, in promoting the positive health attributes of meat appears to be strong. This is despite the move towards plant-based diets by some other orthodox sources such as the World Cancer Fund (National Health and Medical Research Council, 1992; US Department of Health and Human Services, 2000; World Cancer Research Fund & American Institute for Cancer Research, 1997). Yet doctors, used by 45% of the random population sample for food, health or nutrition information (see Table 1 in Appendix 7), receive little formal education about nutrition (Chitwood *et al.*, 1994-95; A. Worsley & A. J. Worsley, 1991). Perhaps educating doctors more fully about nutrition, including both the role of plant-based diets and that of meat, is one way to influence the beliefs of the general population. The consequences are unknown, however, for if doctors were to promote plant-based diets more frequently, this could lead to either (1) a move towards plant-based diets among those in the population who trust doctors, or (2) a decrease in trust in doctors. The latter may occur because individuals are not simply passive receivers of information, but often favour the selection of information that supports their beliefs and viewpoint (Frey, 1986; Hoijer, 1992). Hence they may simply search for another source of information that confirms their belief that meat is necessary. A factor involved in the former possibility - that of a move towards plant-based diets - is the relative ambivalence of many people about meat. Perhaps people with ambivalent

opinions would be influenced by their doctors and maybe more of them would alter their diet than would the few who would reject their doctor's view. This is an area for future investigation.

It is interesting that trust in both orthodox and unorthodox sources were positive predictors of *Health Benefits of Vegetarianism* for non-vegetarians. Since there is a link between vegetarianism and unorthodox sources, it is possible that those non-vegetarians who believe that there are health benefits associated with vegetarianism would be vegetarian if it were not for their trust in orthodox sources.

In Australia over the last decade or so there has been prominent advertising that promotes meat, including its healthiness (e.g. the women and iron campaign, the baby and meat adverts). Mainstream advertising and the mass media generally do not promote meat as being unhealthy. Therefore, it is understandable that those consumers who believe meat is unhealthy would not trust food and nutrition advertising and mass media. Health professionals and others who wish to promote plant-based diets among non-vegetarians may need to increase their use of the mass media. One way to initiate such promotion and produce the necessary funding could be to set up a consortium that consists of government and consumer organisations, university and other research groups, marketing and industry representatives. Similarly, those who wish to increase meat consumption amongst certain subgroups of the population could also reach their targets in this way. There is evidence that in some countries this is already happening (e.g. Meat and Livestock Australia, 2001; World Cancer Research Fund & American Institute for Cancer Research, 1997).

It would be interesting to study more closely the role the media plays in perceptions of meat and vegetarianism, particularly the content of advertising broadcast by meat producers, such as the women and iron campaign mentioned above. For example, longitudinal studies could examine the impact of specific advertisements on consumers' beliefs.

It is not yet known whether changing the information that emanates from the information sources people use and trust would result in dietary change or disuse and distrust of the sources, as discussed above. However, the former may be more likely to occur during life transition periods when people are relatively "ambivalent" and more open to change (Devine, Wolfe, Frongillo, & Bisogni, 1999; Green, 1984; Jabs *et al.*, 1998b; Kemmer *et al.*, 1998). Such transition periods include pregnancy, sickness, early adulthood and old age. Some examples are the adoption of dietary supplement use by pregnant women (Vollset & Lande, 2000) and the adoption of a vegetarian diet after moving to a new area, beginning university, or experiencing a divorce (Jabs *et al.*, 1998b).

Although the use of or trust in social sources were found to be important predictors of positive meat beliefs and meat consumption for non-vegetarians and vegetarians, friends and family are unlike the other information sources in that they cannot easily be used by health promoters to disseminate information (although they possibly could via relationship marketing, which is used by sales companies such as Amway). Friends and family, like other consumers, tend not to be authoritative sources as are (for example) general practitioners. The finding that social sources are associated with meat and vegetarianism health beliefs and meat consumption suggests that if one

consumer is informed about meat and vegetarian diets the result may be information dissemination over that consumer's social network.

11.4.1 Conclusion

Information sources are important correlates of health-related beliefs about meat and vegetarianism and meat consumption. Consumers require accurate information about the health risks and benefits of meat and of vegetarianism. Both orthodox and unorthodox sources, as well as advertising and the mass media, are in good positions to disseminate such information, although advertising and the mass media may not be as useful for reaching vegetarians. These information sources have an important role to play in potentially influencing meat consumption and hence the health of the public.

Chapter 12

PREVALENCE OF PROSPECTIVE VEGETARIANS*

12.1 INTRODUCTION

As noted in Chapter 1, estimates of the prevalence of vegetarianism vary from country to country. Epidemiological data are missing, but public opinion polls and other surveys indicate that 2.5% of the United States population (Vegetarian Resource Group, 2000), 3.7% of Australians (Australian Bureau of Statistics, 1997), and 5.0% of the British population are vegetarian (Vegetarian Society UK, n.d.). There is some evidence that the prevalence of vegetarianism may be increasing. For example, in the United States 1% of the population was reported as being vegetarian in 1997 (American Dietetic Association, 1997b), while 2.1% of the British population identified as vegetarian in 1984 (Gallup, 1997).

Although the numbers of vegetarians are at present relatively low, it appears that many more people choose not to eat meat (or at least some kinds of meat) to some extent, as previously discussed. There has been a decrease in the consumption of red meat in recent years (Baghurst, 1999; Rosegrant *et al.*, 1999) and a study in the United States found that 57% of the population consumes a vegetarian meal sometimes, often or always when eating out (Vegetarian Resource Group, 1999).

* A paper based on this chapter has been submitted for publication in the *British Food Journal* (Lea, E., & Worsley, A. What proportion of consumers are prospective vegetarians?).

While the proportion of people with established vegetarian practice is known, there appears to be little information about the individuals who consume omnivorous diets who are interested to the point of becoming vegetarian themselves. If they do take this step, there are implications for health status, food consumption patterns and the food industry. The focus of this chapter, therefore, is on the estimation of the proportion of the population who may be considered to be at this stage, and an examination of their characteristics relative to vegetarians and other omnivores. The theory behind this is similar to that behind the stage of change model discussed in Chapter 1 (pages 25-26), whereby individuals progress through five separate stages, namely, precontemplation, contemplation, preparation, action and maintenance. Vegetarians are in the action or maintenance stage, depending on whether they have been vegetarian for less than, or over, six months, respectively. This model is useful in the design and implementation of strategies that may effectively modify beliefs and increase the likelihood of dietary change. In particular, it identifies those individuals who are predisposed to adopt the new dietary behaviour (i.e. those in the intermediate stages) and who may influence others to also change their behaviour (Rogers, 1983; Sutton, Balch, & Lefebvre, 1995). Diffusion of innovations theory is also relevant here, as it examines how new practices and ideas spread through the community (Rogers, 1983).

Therefore, the aim of this chapter is to calculate the prevalence of, and describe the characteristics of, those non-vegetarians who hold similar beliefs about meat and vegetarianism as vegetarians and therefore may be prospective vegetarians (aim 4; Chapter 2). This chapter is predominantly exploratory, as there are no known directly comparable existing studies to formulate strong hypotheses from. However, previous

research has found that some non-vegetarians consider meat to be fattening or generally unhealthy and a vegetarian diet to be healthier than an omnivorous diet (Dietz *et al.*, 1994; Holm & Möhl, 2000; Kalof *et al.*, 1999; Povey *et al.*, 2001). In addition, many people like the taste of fruit and vegetables and feel "lighter" and more energetic after consuming them (Balch *et al.*, 1997). Furthermore, a British survey found that most respondents would stop eating meat if they had to kill the animals themselves, which suggests that some meat-eaters may have ethical concerns about eating meat (N. J. Richardson *et al.*, 1993). Indeed, a United States survey found that 43% of non-vegetarians at least partly agreed that a vegetarian diet helps to prevent cruelty to farm animals (Dietz *et al.*, 1994; Kalof *et al.*, 1999). Similar proportions of non-vegetarians agreed that a vegetarian diet has environmental and hunger-related benefits, as discussed in Chapter 1 (Dietz *et al.*, 1994; Kalof *et al.*, 1999). Together, these provide the basis for the expectation that some non-vegetarians will hold similar beliefs to vegetarians (hypothesis 4; Chapter 2).

12.2 METHOD

It was not possible to use the traditional stages of change model to examine the general population's (i.e. random sample's) stages with regards to vegetarianism, and the demographic, psychological and other characteristics associated with each stage, as the majority of respondents (71.9%) were all in one stage (precontemplation)¹, with none being in the action stage² and only 1.5% in the maintenance stage³. Therefore,

¹ That is, omnivorous respondents who had not considered making some changes toward eating a vegetarian diet in the last month *and* who were unlikely to make some changes towards becoming vegetarian within the next six months (items contained in the sixth section of the questionnaire).

² That is, those in the random population sample who were currently vegetarian, and who had been vegetarian for less than six months (sixth section of questionnaire).

³ Those in the random population sample who stated that they were currently vegetarian and who indicated that they had been vegetarian for at least six months (sixth section of questionnaire).

the model could not differentiate respondents adequately for viable statistical analyses. Hence, an alternative method was used, outlined below.

Categorical principal components analysis (CATPCA) was performed on the randomly and non-randomly selected correspondents' responses to three sections of the questionnaire: (1) beliefs about meat, (2) barriers to vegetarian diets, and (3) benefits of vegetarian diets. CATPCA was performed on these sections because they are all specifically related to meat and vegetarianism beliefs, unlike the other sections of the questionnaire. With only a few exceptions, responses to the items contained in these three sections of the questionnaire by self-identified vegetarians, non-vegetarians, and semi-vegetarians were quite different and reached statistical significance (see Chapter 5). Therefore, it was suspected that they could identify those non-vegetarians susceptible to vegetarianism.

Object principal normalisation was used to normalise the object scores and the variables, as this method is useful for identifying any differences or similarities between objects (i.e. between cases). A plot of object points labelled by dietary group (self-identified non-vegetarian, self-identified semi-vegetarian and self-identified vegetarian) was obtained. Cronbach's Alpha was used to measure the internal reliability of the dimensions of the plot, based on the average correlation between items. From this plot, the non-vegetarians who fell into the same range as the vegetarians were identified. This group of non-vegetarians was named *prospective vegetarians*, in contrast to those non-vegetarians who were outside the range of vegetarians: *omnivores*.

Cross-tabulation analyses were performed to examine the responses of prospective vegetarians compared with omnivores and vegetarians for meat and animal product consumption, items about vegetarianism (including interest in vegetarianism and number of vegetarian significant others), nutrition beliefs, use of and trust in food, health and nutrition information sources, personal values and demographic items.

12.3 RESULTS

12.3.1 Prevalence of prospective vegetarians

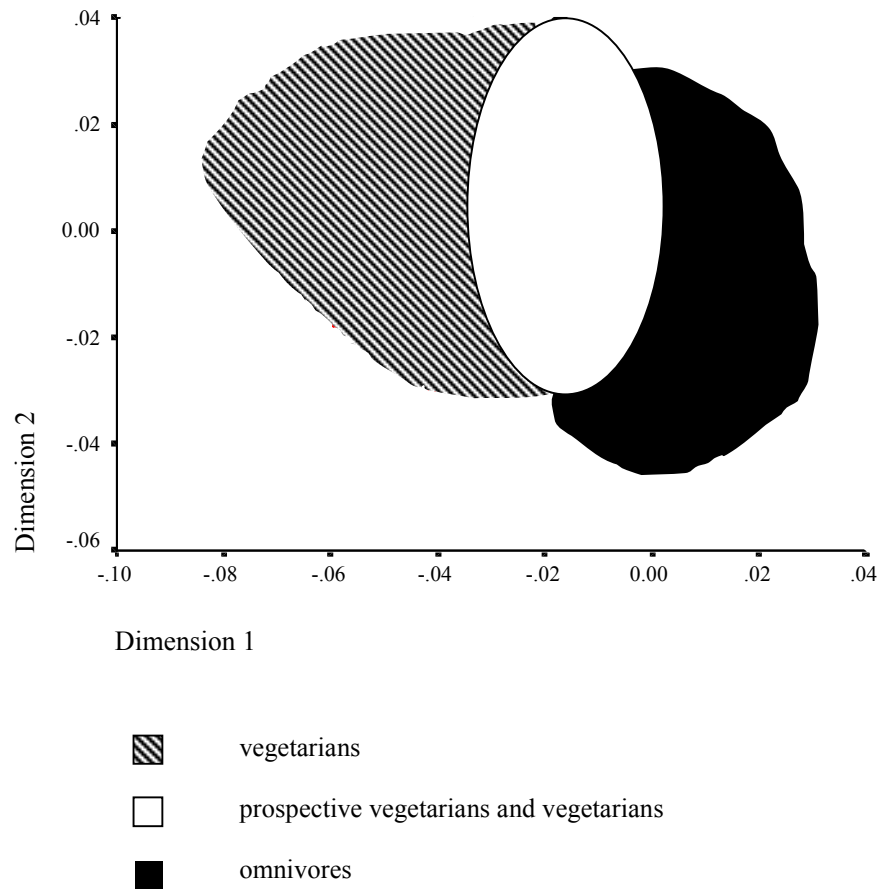
Figure 12.1 displays the areas covered by the object points for the vegetarian group and the two non-vegetarian groups (prospective vegetarians and omnivores). Two dimensions were identified, both with high internal reliability as measured by Cronbach's Alpha (0.98 and 0.88 for Dimensions 1 and 2 respectively). Dimension 1 differentiated reasonably well between vegetarians and non-vegetarians. Thus, this provides further evidence of the suitability of the choice to analyse the beliefs about meat, and benefits and barriers to vegetarian diets responses.

As would be expected, the majority of self-identified semi-vegetarians (about 75%) were in the vegetarian range for the CATPCA of beliefs about meat, barriers and benefits of vegetarianism.

Approximately 15% of non-vegetarians ($n = 81$, equivalent to 13.5% of the random population sample) fell within the range of vegetarians, and were therefore classified as prospective vegetarians. Prospective vegetarians formed a group distinct from the remaining non-vegetarians ($n = 468$) and from vegetarians ($n = 103$), as discussed in the subsequent section.

FIGURE 12.1

Categorical principal components plot showing the areas covered by the object points for the vegetarian group and the two non-vegetarian groups (prospective vegetarians and omnivores) for beliefs about meat, perceived benefits of vegetarianism, and perceived barriers to vegetarianism

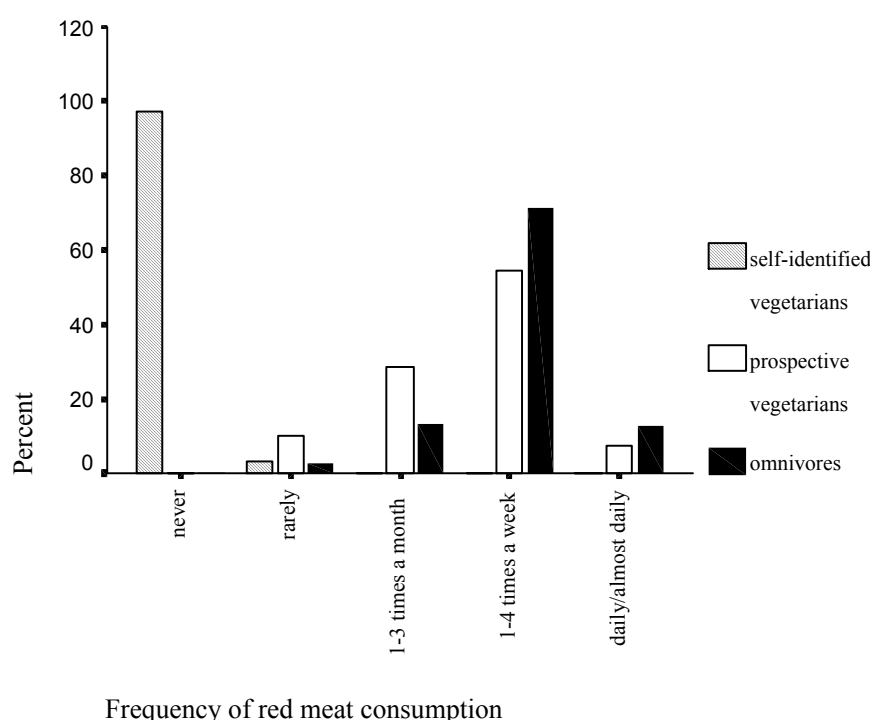


12.3.2 Characteristics of prospective vegetarians

Prospective vegetarians were less likely to eat red meat as frequently as omnivores ($p < 0.001$), and more likely to eat it than vegetarians were ($p < 0.001$). Figure 12.2 displays the differences in frequency of red meat consumption between vegetarians, prospective vegetarians and omnivores. Prospective vegetarians were over three times as likely as omnivores to consume red meat rarely and over twice as likely to consume it only one to three times a month. Prospective vegetarians were also less likely to consume dairy products as frequently as omnivores ($p < 0.01$), although they were more likely to consume them than vegetarians were ($p < 0.001$) (see Table 1, Appendix 12). However, there were no statistically significant differences between

prospective vegetarians and omnivores for white meat, fish/seafood or egg consumption (Table 1, Appendix 12). Differences between prospective vegetarians and vegetarians were all significant ($p < 0.001$) for these food items, with vegetarians consuming them least often (Table 1, Appendix 12).

FIGURE 12.2
Frequency of red meat consumption ("never", "rarely", "one to three times a month", "one to four times a week", "daily or almost daily") for vegetarians, prospective vegetarians and omnivores, expressed as the percentage of cases



Prospective vegetarians were more interested in vegetarianism than omnivores were ($p < 0.001$). They were twice as likely as omnivores to be somewhat interested (54% versus 27%), and almost 10% were very interested compared to about 2% of omnivores (Figure 12.3). Prospective vegetarians had talked about vegetarianism more often than omnivores had ($p < 0.001$), had thought more in the past month about making changes towards consuming a vegetarian diet ($p < 0.001$), were more likely to think that during the next month they would make some changes towards becoming vegetarian ($p < 0.001$) and were also more likely to think that during the next six

months they would make such changes ($p < 0.001$). Prospective vegetarians were three times as likely as omnivores to state that it was quite likely that they would make some changes during the next six months, and about 3% of prospective vegetarians stated that it was very likely, but no omnivores (Figure 12.4). Also of note is that over 10% of prospective vegetarians were unsure whether or not they would make any changes towards the consumption of a vegetarian diet. This may indicate that they are somewhat ambivalent about vegetarianism, unlike omnivores who were more against the idea of becoming vegetarian. Prospective vegetarians had more friends who were vegetarian than omnivores had ($p < 0.01$) but fewer than vegetarians had ($p < 0.001$), as shown in Figure 12.5.

FIGURE 12.3
The level of interest in vegetarianism ("not interested", "somewhat interested", "very interested", or "unsure" if interested) for prospective vegetarians and omnivores, expressed as the percentage of cases

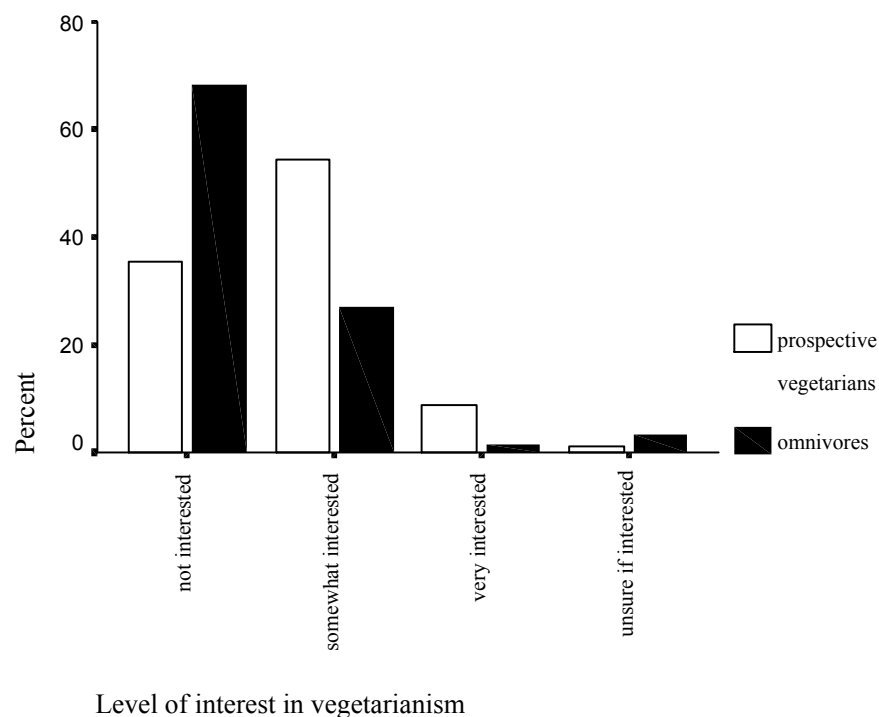
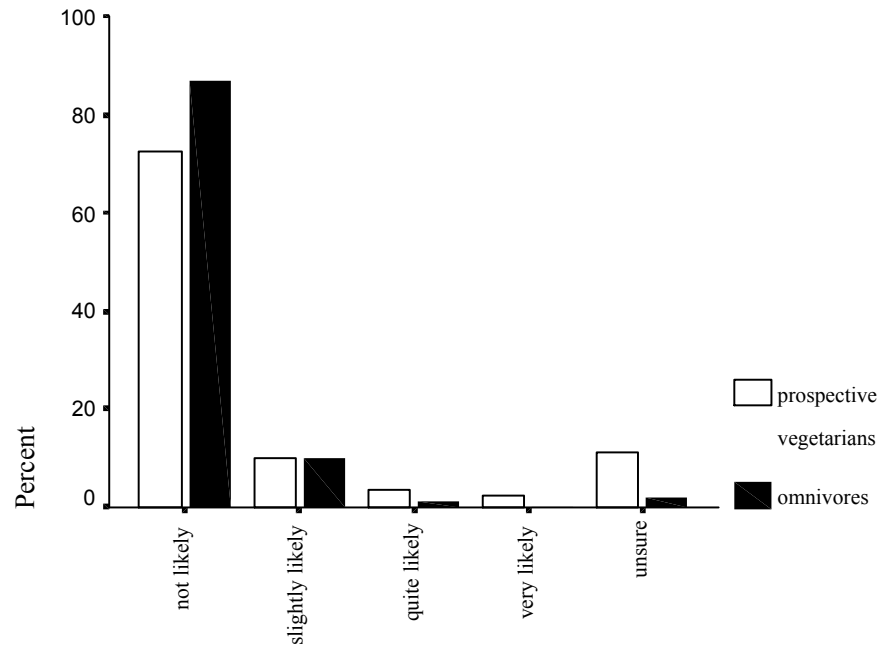


FIGURE 12.4

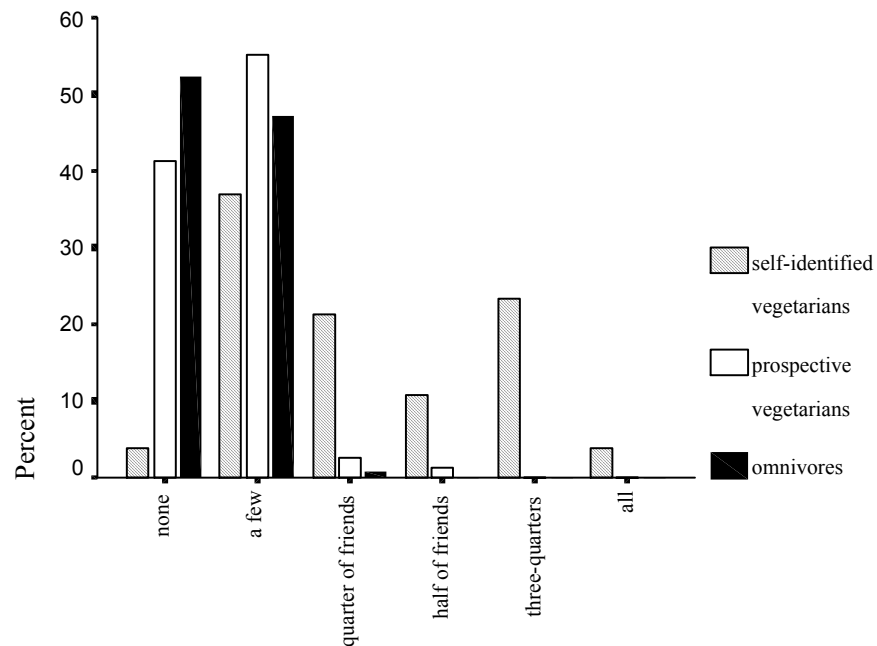
The perceived likelihood of making some changes towards becoming vegetarian during the next six months ("not likely", "slightly likely", "quite likely", "very likely", or "unsure") for prospective vegetarians and omnivores, expressed as the percentage of cases



Likelihood of changes towards becoming vegetarian in next 6 months

FIGURE 12.5

Proportion of the friends of vegetarians, prospective vegetarians and omnivores who are vegetarian ("none", "a few", "about a quarter of my friends", "about half of my friends", "about three-quarters of my friends", "all"), expressed as the percentage of cases



Proportion of friends who are vegetarian

Compared with the remainder of the non-vegetarians (omnivores), prospective vegetarians were more likely to search for information on healthy eating, with 74% of prospective vegetarians and 58% of omnivores agreeing that they frequently look for such information (Table 12.1). There was no significant difference between vegetarians and prospective vegetarians. Prospective vegetarians were the least likely of the three groups to agree with "I do not need to make any changes to the food I eat as it is already healthy enough", with vegetarians most likely to agree (Table 12.1). The difference between vegetarians and prospective vegetarians was statistically significant, and, although the difference between prospective vegetarians and omnivores was not significant at the 0.05 level, it was close to significance ($p = 0.058$).

TABLE 12.1
Differences between vegetarians', prospective vegetarians' and omnivores' general nutrition beliefs and behaviours[†]

ITEM	Vegetarians (V)	Prospective Vegetarians (PV)	Omnivores (O)	p V, PV	p PV, O
	% Agree (% Unsure)				
I frequently look for information on healthy eating	77 (11)	74 (9)	58 (16)	NS	*
I do not need to make any changes to the food I eat as it is already healthy enough	58 (16)	40 (12)	45 (20)	**	NS [‡]

[†]The p -values for comparisons between vegetarians and prospective vegetarians, and between prospective vegetarians and omnivores are also given. Only the questionnaire items where there were statistically significant differences in the responses of prospective vegetarians and omnivores are listed (although one item where the difference neared statistical significance is also listed).

[‡] $p = 0.058$

** $p < 0.01$, * $p < 0.05$

In general, despite prospective vegetarians falling inside the CATPCA plot's range for vegetarians, prospective vegetarians were closer to omnivores than to vegetarians in their use of information sources to find out about food, health or nutrition, trust in information sources, and personal values. However, there were exceptions, which are displayed in Tables 12.2, 12.3 and 12.6. (Note that for these tables and in the text, in

general only the items where there was a statistically significant difference present between omnivores and prospective vegetarians are shown.⁴) Prospective vegetarians were usually intermediate between vegetarians and omnivores, and therefore could be clearly differentiated from both groups.

There were differences between vegetarians, prospective vegetarians and omnivores for use of and trust in sources of food/nutrition/health information (Tables 12.2 and 12.3 respectively). In most cases, prospective vegetarians were intermediate between vegetarians and omnivores, although prospective vegetarians used and trusted dietitians and used cooking magazines as sources of food, health and nutrition information more than the other two groups. (A larger proportion of prospective vegetarians also used and trusted teachers, schools and higher education more than omnivores and vegetarians did, but the difference between vegetarians and prospective vegetarians did not reach statistical significance.) For example, 23% of omnivores trusted vegetarian magazines compared with 44% of prospective vegetarians and 81% of vegetarians. There was no significant difference between vegetarians and prospective vegetarians for use of and trust in health food shops/staff. Advertising was trusted by 4% of vegetarians, and by 18% and 20% of prospective vegetarians and omnivores respectively. Although the difference between prospective vegetarians and omnivores was not significant at the 0.05 level, it approached statistical significance ($p = 0.056$).

⁴ For the items where the responses of prospective vegetarians and omnivores were not significantly different and which therefore are not reported here in Chapter 12, the results for non-vegetarians in Chapter 5 provide an indication of the responses of prospective vegetarians/omnivores. Chapter 5 also provides the responses of vegetarians to the items contained within the main sections of the questionnaire.

TABLE 12.2
Differences between vegetarians', prospective vegetarians' and omnivores' frequency of use of food, health and nutrition information sources[†]

ITEM	Vegetarians (V)	Prospective Vegetarians (PV)	Omnivores (O)	<i>p</i> V, PV	<i>p</i> PV, O
	% that Sometimes or Often used the source				
Use dietitians/nutritionists	28	45	30	*	**
Use health food shops/staff	45	40	24	NS	**
Use articles in vegetarian magazines	78	28	11	***	***
Use alternative health practitioners	44	29	19	*	*
Use articles in cooking magazines	43	69	56	***	*
Use teachers/school/higher education	22	26	17	NS	*

[†]The *p*-values for comparisons between vegetarians and prospective vegetarians, and between prospective vegetarians and omnivores are also given. Only the questionnaire items where there were statistically significant differences in the responses of prospective vegetarians and omnivores are listed.

*** *p* < 0.001, ** *p* < 0.01, * *p* < 0.05

TABLE 12.3
Differences between vegetarians', prospective vegetarians' and omnivores' frequency of trust in food, health and nutrition information sources[†]

ITEM	Vegetarians (V)	Prospective Vegetarians (PV)	Omnivores (O)	<i>p</i> V, PV	<i>p</i> PV, O
	% that Trusted the information given by the source				
		<i>(% Unsure)</i>			
Trust television programs	12 (32)	31 (35)	35 (44)	**	*
Trust newspaper articles	15 (43)	28 (44)	31 (53)	*	*
Trust advertising	4 (12)	18 (31)	20 (43)	***	NS [‡]
Trust dietitians/nutritionists	49 (41)	73 (19)	71 (27)	**	*
Trust National Heart F'dn/Anti- Cancer F'dn	50 (31)	80 (15)	84 (15)	***	**
Trust health food shops/staff	50 (41)	46 (36)	30 (54)	NS	**
Trust articles in vegetarian magazines	81 (16)	44 (45)	23 (64)	***	***
Trust teachers/school/higher education	23 (54)	38 (48)	23 (67)	NS	**

[†]The *p*-values for comparisons between vegetarians and prospective vegetarians, and between prospective vegetarians and omnivores are also given. Only the questionnaire items where there were statistically significant differences in the responses of prospective vegetarians and omnivores are listed (although one item where the difference neared statistical significance is also listed).

[‡]*p* = 0.056

*** *p* < 0.001, ** *p* < 0.01, * *p* < 0.05

Tables 12.4 and 12.5 list the main sources of food, health and nutrition information used and trusted by prospective vegetarians, omnivores and vegetarians. Prospective vegetarians and omnivores used and trusted similar sources overall, although more prospective vegetarians tended to use each source for food, health and nutrition information than did omnivores. Food labels and family members were the sources of

food, health and nutrition information used most frequently by the largest proportion of both prospective vegetarians and omnivores (Table 12.4). Food labels were also important for vegetarians. Orthodox health sources, particularly doctors and the National Heart and Anti-Cancer Foundations, were the most highly trusted sources of food, health and nutrition information for prospective vegetarians and omnivores (Table 12.5).

TABLE 12.4
The eight most highly used sources of food, health and nutrition information for vegetarians, prospective vegetarians and omnivores

Most highly used sources of food, health and nutrition information[†]	%
Vegetarians	
Use books	85
Use food labels	83
Use articles in vegetarian magazines	78
Use articles in health magazines	68
Use friends	64
Use newspaper articles	49
Use health food shops/staff	45
Use alternative health practitioners	44
Prospective vegetarians	
Use food labels	84
Use family	71
Use articles in cooking magazines*	69
Use books*	69
Use advertising	68
Use friends	64
Use television programs	61
Use newspaper articles	58
Omnivores	
Use food labels	80
Use family	69
Use television programs	62
Use friends [‡]	60
Use advertising [‡]	60
Use newspaper articles [‡]	60
Use books	58
Use doctors (medical)	46

[†]"sometimes" and "often" use

* 69.1% used cooking magazines and 68.8% used books at least sometimes as a source of food, health or nutrition information

[‡] 60.0% used friends, 59.8% used advertising and 59.6% used newspaper articles as a source of food, health or nutrition information

TABLE 12.5
The eight most highly trusted sources of food, health and nutrition information for vegetarians, prospective vegetarians and omnivores

Most highly trusted sources of food, health and nutrition information[†]	%
Vegetarians	
Trust vegetarian magazines	81
Trust health magazines	62
Trust books	58
Trust health food shops/staff*	50
Trust National Heart Foundation/Anti-Cancer Foundation*	50
Trust alternative health practitioners [‡]	49
Trust dietitians/nutritionists [‡]	49
Trust science magazines	40
Prospective vegetarians	
Trust doctors (medical)	82
Trust National Heart Foundation/Anti-Cancer Foundation	80
Trust dietitians/nutritionists	73
Trust health magazines	58
Trust family ††	55
Trust cooking magazines ††	55
Trust books	49
Trust health food shops/staff	46
Omnivores	
Trust National Heart Foundation/Anti-Cancer Foundation	84
Trust doctors (medical)	83
Trust dietitians/nutritionists	71
Trust family	56
Trust cooking magazines	51
Trust health magazines	49
Trust books	46
Trust food labels	44

[†] "trust totally" and "trust"

* 50.0% trusted health food shops/staff, while 49.5% trusted the National Heart and Anti-Cancer Foundations

[‡] 49.0% trusted alternative health practitioners and dietitians/nutritionists; however, the former were distrusted by 6.9% of vegetarians, while the latter were distrusted by 9.8% of vegetarians

†† 55.1% trusted family while 54.5% trusted articles in cooking magazines as a source of food, health or nutrition information

There were differences between the personal values of prospective vegetarians, vegetarians and omnivores. "Protecting the environment", "A world of beauty", "Helpful", "Enjoying life", "Wealth", "Devout" and "Respect for tradition" were more important guiding principles for prospective vegetarians than for omnivores, with the latter three values being more important than they were for both omnivores *and* vegetarians (Table 12.6).

TABLE 12.6
Personal value differences between vegetarians, prospective vegetarians and omnivores[†]

ITEM	Vegetarians (V)	Prospective Vegetarians (PV)	Omnivores (O)	<i>p</i> V, PV	<i>p</i> PV, O
	% that stated the item is Very Important to them (% Fairly Important)				
Protecting the environment (preserving nature)	87 (13)	65 (31)	47 (47)	***	*
A world of beauty (beauty of nature and the arts)	71 (26)	48 (45)	23 (57)	**	***
Helpful (working for the welfare of others)	44 (52)	55 (41)	33 (61)	NS	***
Enjoying life (enjoying food, sex, leisure etc.)	60 (36)	72 (23)	66 (33)	NS	*
Wealth (material possessions, money)	6 (27)	19 (47)	7 (53)	***	**
Devout (holding to religious faith and belief)	15 (24)	32 (30)	18 (34)	**	*
Respect for tradition (preservation of time-honoured customs)	14 (27)	45 (33)	24 (50)	***	***

[†]The *p*-values for comparisons between vegetarians and prospective vegetarians, and between prospective vegetarians and omnivores are also given. Only the questionnaire items where there were statistically significant differences in the responses of prospective vegetarians and omnivores are listed.

*** *p* < 0.001, ** *p* < 0.01, * *p* < 0.05

With regard to demographic variables, prospective vegetarians were more likely than omnivores to be female ($p < 0.05$); about 69% of prospective vegetarians were female compared to 54% of omnivores. Prospective vegetarians were also more likely to be born outside of Australia ($p < 0.01$), with approximately 37% of prospective vegetarians and 24% of omnivores being born in another country. They were less likely to identify as Anglo-Australian (55% of prospective vegetarians identified as Anglo-Australian compared to 69% of omnivores; $p < 0.05$), and were less likely to be employed full-time (19% of prospective vegetarians and 32% of omnivores were employed full-time; $p < 0.01$). There were no statistically significant age, education, income, marital status or religious (religion vs. no religion) differences between prospective vegetarians and omnivores.

Turning to demographic differences between prospective vegetarians and vegetarians, prospective vegetarians were more likely to be female (53% of vegetarians were

female; $p < 0.05$), older ($p < 0.001$), married or living together (62% of prospective vegetarians vs. 40% of vegetarians; $p < 0.001$) and religious ($p < 0.001$), but less likely to be highly educated ($p < 0.001$). There were no statistically significant differences with regard to country of birth, income, employment status (employed full-time vs. not employed full-time), or Anglo-Australian status.

Tables 12.7 to 12.9 list the eight strongest beliefs about meat, barriers and benefits of consuming a vegetarian diet for prospective vegetarians, omnivores and vegetarians. These were the sets of items that were used to identify prospective vegetarians initially. These tables explore some of the differences and similarities of the three groups in a very concrete way, whereas the CATPCA results are quite abstract and focused on individuals.

It can be seen in Table 12.7 that 60% of prospective vegetarians stated that they enjoy eating red meat, compared to 86% of omnivores, and that, while about half of prospective vegetarians believed meat to be important or necessary in the diet, a larger proportion of omnivores held such beliefs. There were also strong differences between prospective vegetarians and omnivores for the beliefs that were not so highly agreed with (data reported in Table 2, Appendix 12⁵). For example, 39% of prospective vegetarians were found to believe that "Meat production is cruel to animals", compared to 15% of omnivores ($p < 0.001$), while 17% of prospective vegetarians believed that "Humans have no right to kill animals for food", compared to 6% of omnivores ($p < 0.01$). A higher proportion of prospective vegetarians than

⁵ Appendix 12 contains the responses of vegetarians, prospective vegetarians and omnivores to all of the beliefs about meat, barriers and benefits of vegetarianism items, together with the p -values for

omnivores found meat to be disgusting (11% vs. 1%; $p < 0.001$), unhealthy (13% vs. 2%; $p < 0.001$), and a cause of cancer (10% vs. 1%; $p < 0.001$).

Table 12.8 illustrates that prospective vegetarians perceived there to be fewer barriers to the consumption of a vegetarian diet than did omnivores, although the strongest two barriers for omnivores and prospective vegetarians were identical (enjoyment of meat eating and unwillingness to alter eating habits). There were also clear differences between prospective vegetarians and omnivores for other, less important barriers (data reported in Table 3, Appendix 12). For example, more prospective vegetarians were concerned about feeling conspicuous compared to omnivores (16% vs. 7%; $p < 0.05$). Fewer prospective vegetarians than omnivores believed that vegetarian diets are boring (20% vs. 25%; $p < 0.001$), inconvenient (13% vs. 25%; $p < 0.001$) and take too long to prepare (3% vs. 9%; $p < 0.001$).

Table 12.9 shows that a higher proportion of prospective vegetarians perceived there to be benefits associated with the consumption of a vegetarian diet than omnivores, with the strongest benefits all health-related. Again, the strongest two benefits were the same for both omnivores and prospective vegetarians ("Eat more fruit and vegetables" and "Decrease saturated fat intake in my diet"). There were also strong differences between prospective vegetarians and omnivores with regard to the less important perceived benefits of consuming a vegetarian diet (data reported in Table 4, Appendix 12). For example, a higher proportion of prospective vegetarians than omnivores believed that the consumption of a vegetarian diet could help one to "Live longer" (47% vs. 9%; $p < 0.001$), "Have a better quality of life" (50% vs. 6%;

comparisons between vegetarians and prospective vegetarians, and between prospective vegetarians

$p < 0.001$), "Have a tastier diet" (25% vs. 4%; $p < 0.001$), "Help the environment" (48% vs. 13%; $p < 0.001$), "Help animal welfare/rights" (58% vs. 28%; $p < 0.001$), "Increase the efficiency of food production" (32% vs. 8%; $p < 0.001$), and "Create a more peaceful world" (26% vs. 2%; $p < 0.001$).

TABLE 12.7
The eight strongest beliefs about meat for vegetarians, prospective vegetarians and omnivores

Strongest beliefs[†]	%
Vegetarians	
Meat production is cruel to animals	93
I think meat is disgusting	71
Humans have no right to kill animals for food	69
Meat such as beef or lamb is unhealthy to eat	64
Meat causes heart disease	55
Meat causes cancer*	46
Red meat such as beef or lamb is fattening*	46
Meat is more a food that men are likely to eat	35
Prospective vegetarians	
Meat is more a food that men are likely to eat [‡]	60
I love to eat red meat such as beef, veal or lamb [‡]	60
Meat is necessary in children's diets ^{††}	53
Meat is important for building strength ^{††}	53
Red meat is very expensive	49
Meat is necessary in the adult human diet•	46
Red meat is the best-absorbed source of dietary iron•	46
When I eat out to celebrate a social occasion, I usually eat some kind of red meat	40
Omnivores	
I love to eat red meat such as beef, veal or lamb	86
Meat is necessary in the adult human diet	72
Meat is necessary in children's diets	69
Meat is important for building strength	64
Red meat is the best-absorbed source of dietary iron	53
Meat is more a food that men are likely to eat	50
Red meat is very expensive	47
When I eat out to celebrate a social occasion, I usually eat some kind of red meat	45

[†]"strongly agree" and "agree"

* 45.6% agreed that "Meat causes cancer" while 45.5% agreed that "Red meat such as beef or lamb is fattening"

[‡] 60.3% agreed with both items, however 29.4% disagreed with "I love to eat red meat such as beef, veal or lamb" while 26.9% disagreed that "Meat is more a food that men are likely to eat"

^{††} 53.2% agreed that "Meat is necessary in children's diets" while 52.6% agreed that "Meat is important for building strength"

• 46.2% agreed that "Meat is necessary in the adult human diet" while 45.6% agreed that "Red meat is the best-absorbed source of dietary iron"

and omnivores.

TABLE 12.8
The eight strongest barriers to the consumption of a vegetarian diet for vegetarians, prospective vegetarians and omnivores

Strongest barriers to the consumption of a vegetarian diet[†]	%
Vegetarians	
There is too limited a choice when I eat out	31
My family eats meat	20
My friends eat meat	18
I need more information about vegetarian diets	14
Vegetarian options are not available where I shop or in the canteen or at my home	12
I would (or do) feel conspicuous among others	8
My family/spouse/partner won't eat vegetarian food*	5
People would (or do) think that I'm a wimp or not "macho" enough*	5
Prospective vegetarians	
I like eating meat	74
I do not want to change my eating habit or routine [‡]	41
I need more information about vegetarian diets [‡]	41
My family eats meat	38
I think humans are meant to eat meat	32
There is too limited a choice when I eat out	30
I would be (or am) worried about my health (other than lack of iron or protein)	29
My family/spouse/partner won't eat vegetarian food	27
Omnivores	
I like eating meat	84
I do not want to change my eating habit or routine	62
I think humans are meant to eat meat	50
My family eats meat	44
I need more information about vegetarian diets	42
There is too limited a choice when I eat out	36
My friends eat meat	33
My family/spouse/partner won't eat vegetarian food	32

[†]"strongly agree" and "agree"

* Identical proportions of vegetarians agreed (and disagreed) that these items were a barrier to the consumption of a vegetarian diet

[‡] 41.0% and 40.5% agreed that habit and the need for further information, respectively, were barriers to the consumption of a vegetarian diet

TABLE 12.9
The eight strongest benefits of the consumption of a vegetarian diet for vegetarians, prospective vegetarians and omnivores

Strongest benefits of the consumption of a vegetarian diet[†]	%
Vegetarians	
Help animal welfare/rights	99
Help the environment	97
Stay healthy*	94
Eat more fruit and vegetables*	94
Be healthier by decreasing my intake of chemicals, steroids and antibiotics which are found in meat	93
Have a tastier diet	90
Prevent disease in general (e.g. heart disease, cancer) [‡]	89
Decrease saturated fat intake in my diet [‡]	89
Prospective vegetarians	
Eat more fruit and vegetables	91
Decrease saturated fat intake in my diet	85
Stay healthy	69
Prevent disease in general (e.g. heart disease, cancer)	67
Control my weight	63
Be healthier by decreasing my intake of chemicals, steroids and antibiotics which are found in meat	62
Have plenty of energy ††	60
Eat a greater variety of interesting foods ††	60
Omnivores	
Eat more fruit and vegetables	71
Decrease saturated fat intake in my diet	60
Control my weight	33
Help animal welfare/rights	28
Prevent disease in general (e.g. heart disease, cancer)	24
Be healthier by decreasing my intake of chemicals, steroids and antibiotics which are found in meat	21
Stay healthy	18
Eat a greater variety of interesting foods	16

[†]"strongly agree" and "agree"

* 94.1% agreed with both of these items, however, 3.9% disagreed with "Eat more fruit and vegetables" while no-one disagreed with "Stay healthy"

[‡] 89.3% agreed with both of these items, however, 1.0% disagreed with "Prevent disease in general" while 2.0% disagreed with "Decrease saturated fat intake in my diet"

†† 60.3% agreed with "Have plenty of energy" while 59.7% agreed with "Eat a greater variety of interesting foods"

12.4 DISCUSSION

As reported in Chapter 4, the random population survey found that 1.5% and 7.2% of the South Australian population identify as vegetarian and semi-vegetarian respectively, although the 1995 National Nutrition Survey reported that a higher proportion (3.3%) of the South Australian population is vegetarian (Australian Bureau of Statistics, 1995). With the addition of the 13.5% of the population who may be

classified as prospective vegetarians, a substantial minority (22.2%) of Australians appear to have a positive attitude towards vegetarianism and have either already become vegetarian or low meat consumers, or may be susceptible to the promotion of vegetarianism. To the candidate's knowledge, there are no comparable data available at present on attitudes towards vegetarianism amongst omnivores in similar countries such as the United States or Britain; this would be an interesting area for future research and would enable comparisons to be made between different countries. Nonetheless, some data on related behaviours suggests that the results of any comparable attitudinal studies conducted in future in the United Kingdom may be similar to these results. A survey found that 28% of the British population stated that they were reducing their meat consumption and a further 4% that they do not eat meat (N. J. Richardson, Shepherd *et al.*, 1994). In addition, another British survey reported that 30% of the population had purchased organic food in the last three months (Coriolis Research, 2000). The main reasons given for such purchases were health (including the avoidance of pesticides), taste, animal welfare and the environment (Coriolis Research, 2000). These reasons for the purchase of organic foods are similar to those found in a recent nation-wide survey of Australians (Lockie, Lyons, Lawrence, & Mummery, 2001) and are issues that are also of importance to prospective vegetarians. These British figures, although higher, are not too different to the figure reported here for the prevalence of people who have similar beliefs about vegetarianism as vegetarians and those who already have a low or nil meat consumption.

Those who are likely to be susceptible to the adoption of vegetarian practices are also likely to be people who already consume a greater proportion of plant foods than the

general population. However, the present study did not obtain data on the frequency of consumption of plant foods, so further studies are required to verify this.

It may be expected that the proportion of non-vegetarians susceptible to the promotion of plant-based diets that contain some meat, such as that advocated by the World Cancer Research Fund (1997), would be higher than that susceptible to the promotion of the stricter diet of vegetarianism. If future research confirms this, it should be very encouraging for health professionals who advocate plant-based diets. There may also be implications for the food industry.

Prospective vegetarians searched for information on healthy eating more than omnivores did. This may indicate that they had found more information on vegetarianism and hence were more accepting of it. It also suggests that if more information on vegetarianism and health was widely available, prospective vegetarians may be more readily influenced to become vegetarian, particularly if such information specifically addressed their concerns with, and perceived benefits of, vegetarianism. The finding that about half of prospective vegetarians - a higher proportion than the other two groups - believed that they need to improve the healthiness of their diet supports the notion that they are open to dietary change.

It is logical that consumers who fall in the same range as vegetarians for beliefs about meat, and perceived barriers and benefits of vegetarianism would have lower (red) meat consumption than those who do not. Red meat is usually the first animal product to be avoided by meat reducers, followed by white meat and then fish, as it epitomises all of the negative aspects of "meat" (Fiddes, 1991; Jabs *et al*, 1998b; N. J.

Richardson, MacFie, & Shepherd, 1994; N. J. Richardson, Shepherd *et al.*, 1994). Research has found that often people who only avoid red meat have an increased consumption of white meat and fish (N. J. Richardson, Shepherd *et al.*, 1994). However, this study found no difference in frequency of white meat and fish/seafood consumption between prospective vegetarians and omnivores. Dairy consumption was lower, perhaps because of a perception of high fat content and other negative health associations (Cashel, Crawford, & Deakin, 2000).

Significant others often influence beliefs and behaviour, such as intention to eat beef (Lloyd *et al.*, 1995; N. J. Richardson *et al.*, 1993; Sapp & Harrod, 1989; Zey & McIntosh, 1992). This may have been the case for the prospective vegetarians, as they had a significantly higher proportion of vegetarian friends than did the omnivores. A study of pesco-vegetarians⁶, who may be considered intermediate between non-vegetarians and vegetarians and therefore perhaps somewhat similar to prospective vegetarians, found that they had strong social support; 47% had vegetarian family members and over 90% had at least a few vegetarian friends (53% had a few vegetarian friends, while for another 42%, between one- and three-quarters of their friends were vegetarian) (Freeland-Graves, Greninger, & Young, 1986). A longitudinal study would be required to determine if the prospective vegetarians had been influenced by their friends or, rather, if they had gravitated towards people who were similar to themselves.

Vegetarians are generally more in favour of unorthodox sources of health and nutrition information than are non-vegetarians (Freeland-Graves, Greninger, Graves,

⁶ Those who consume fish, but not red or white meat, and therefore are not fully vegetarian *per se*.

& Young, 1986; Furnham & Forey, 1994). In this study, it was vegetarian magazines and health food shops/staff where the more important differences between prospective vegetarians and omnivores lay, although there was a difference in the use of alternative health practitioners. Vegetarian magazines are, of course, focused specifically on vegetarianism; perhaps health food shops/staff are also perceived as being vegetarian-oriented. In conjunction with their (moderate) use of and trust in unorthodox sources, however, prospective vegetarians also trusted orthodox sources highly, particularly when compared to vegetarians. It seems that prospective vegetarians believe both types of sources have something to offer, although usually orthodox sources were used and trusted more than unorthodox sources.

Research has found that vegetarians tend to hold different values to omnivores. In particular, universal values such as equality and protecting the environment are more important among vegetarians (Allen *et al.*, 2000; Worsley *et al.*, 1995). This study found that prospective vegetarians held some universal and other values to be more important than did omnivores, although many other values, including equality, were of similar importance for omnivores and prospective vegetarians. Furthermore, prospective vegetarians held certain values, such as tradition and wealth, more strongly than did either omnivores or vegetarians. Again, the question is whether these differences resulted from the beliefs of prospective vegetarians about meat and vegetarianism, or whether the value differences partially influenced their beliefs.

Turning to demography, the lower proportion of prospective vegetarians employed full-time compared to omnivores may be partly explained by the higher proportion of

women in this group, since women are less likely to be employed full-time than men (Australian Bureau of Statistics, 1996).

Generally, more women than men hold negative attitudes towards meat and are vegetarians or meat reducers (Australian Bureau of Statistics, 1997; Holm & Møhl, 2000; Worsley & Skrzypiec, 1997). Therefore, it is not surprising that a larger proportion of prospective vegetarians were women compared to omnivores. Meat, particularly red meat, is often associated with masculinity: meat is seen as men's food in many cultures, while non-meat foods such as vegetables are seen as women's food (Adams, 1990). This is certainly the case in Australia (e.g. the "feed the man meat" advertising campaign of a few years ago). In addition, women are generally more health-conscious than men, which may lead to greater appreciation of fruits and vegetables in particular (Fagerli & Wandel, 1999). They tend to have more knowledge about the healthiness of different foods, prefer healthier foods, and tend to rate them as more pleasurable than men do (Rappoport *et al*, 1993) .

Australia has historically been a country of high meat consumption (Baghurst, 1999; Santich, 1996), particularly when compared to Asian and Mediterranean countries. Meat is a more central part of the diet than complex carbohydrates (Mintz, 1985). This may be why prospective vegetarians and vegetarians were less likely to identify as Anglo-Australian or to be born in Australia than omnivores.

The psychographic and demographic profile of the prospective vegetarians formed here may enable this group to be targeted for dietary interventions and communications. Prospective vegetarians are probably more motivated to alter their

meat consumption than the remaining non-vegetarian population. They may make ideal targets for those who wish to promote plant-based diets that contain some meat or vegetarian plant-based diets; they also may form a solid base for the spread of plant-based eating patterns throughout the community (diffusion of innovations theory (Rogers, 1983)). Those who wish to promote meat and maintain or increase the current level of meat consumption in Australia may also need to heed the characteristics of prospective vegetarians.

Information about how to prepare tasty, healthy, easy plant-based meals, possibly based on the usual meal format to diminish the sense of a large alteration in eating habits, may be useful to increase the consumption of plant foods among prospective vegetarians. For example, the use of meat substitutes/analogues ("fake meat") or vegetarian foods that can take the place of meat in a recipe, such as tofu or lentils, could be encouraged. The low saturated fat content of most plant-based meals and the health-promoting properties of plant foods are likely to appeal to prospective vegetarians, given their strong belief that there are health benefits associated with vegetarian diets and their overall stronger health-orientation compared to omnivores. Health is one of the pathways to the adoption of a vegetarian diet (Jabs *et al.*, 1998b). Alternatively, a health-oriented approach combined with an emphasis on the tastiness and convenience of meat may be successful in the promotion of meat amongst prospective vegetarians.

Although there were found to be statistically significant differences between prospective vegetarians and omnivores for the use of and trust in certain sources of food, health and nutrition information, the *main* sources used and trusted by both

groups were similar. However, prospective vegetarians may be more likely to be influenced by any information about vegetarianism provided by these sources than are omnivores. It is possible that they have more accessible attitudes about meat and vegetarianism than omnivores (see Fabrigar, Priester, Petty, & Wegener, 1998). Thus, prospective vegetarians and omnivores could largely be targeted through similar sources of information, although the dietary message would need to differ in accordance with the distinct characteristics of these two groups.

12.4.1 Conclusion

It appears that a substantial proportion of Australian non-vegetarians have the potential to adopt vegetarian dietary practices. To the candidate's knowledge, this appears to be the first study that has established this potential dietary shift. Clearly, these findings have implications for the health status of these individuals and for the food industry. It is essential that the former are sufficiently knowledgeable about the potential health benefits and risks of vegetarian diets, while the latter will need to respond to any potential or actual dietary shifts in the population. Compared to other non-vegetarians, prospective vegetarians differ in their meat consumption behaviour, demographic characteristics, beliefs, values, information seeking behaviour, and level of trust in information sources. These characteristics may be important to consider if attempts are made to influence meat beliefs and consumption.

Chapter 13

DISCUSSION

13.1 INTRODUCTION

This thesis has: (1) examined the differences and similarities between vegetarians, semi-vegetarians and non-vegetarians with regard to meat and vegetarianism beliefs and a number of other variables; (2) elucidated the factors (including the sources of food, health and nutrition information) associated with frequency of meat consumption and four sets of health-related meat and vegetarianism beliefs; and (3) calculated the proportion of prospective vegetarians in the population and examined their characteristics.

This discussion will relate the key findings to previous research, examine the public health and wider implications of the findings, suggest future research directions, and indicate the limitations of this study.

13.2 KEY FINDINGS

13.2.1 Prevalence of vegetarianism

The random population survey found that 1.5% of the South Australian population identified as vegetarian, with an additional 7.2% as semi-vegetarian. The prevalence of vegetarianism was similar to that found in a recent United States survey (2.5% "actual" vegetarians in 2000 (Vegetarian Resource Group, 2000)), although it was lower than that reported by the National Nutrition Survey for South Australia in 1995 (3.3%, self-identified (Australian Bureau of Statistics, 1995)) and also than that found by United Kingdom studies (e.g. 5% in 1999, self-identified (Vegetarian Society UK,

n.d.)). Aside from the National Nutrition Survey, there has been no random population survey other than the present one that has estimated the prevalence of vegetarianism in South Australia, to the best of the candidate's knowledge.

13.2.2 Differences between vegetarians and non-vegetarians

As expected, there were differences between vegetarians, semi-vegetarians and non-vegetarians with regard to their beliefs about meat and vegetarian diets. In addition, there were large differences in their general nutrition beliefs and behaviours, personal values, and level of use and trust in food, health and nutrition information sources (confirming hypothesis 1; Chapter 2).

As discussed in Chapter 5, some of these findings were in agreement with other studies (e.g. Allen *et al.*, 2000; Dietz *et al.*, 1995; Freeland-Graves, Greninger, Graves, & Young, 1986; Furnham & Forey, 1994; Hamilton, 1993; Knutsen, 1994; N. J. Richardson, Shepherd *et al.*, 1994; Worsley *et al.*, 1995). For example, the results corroborated with previous research that has suggested that vegetarians place greater importance on *Universal* values than non-vegetarians and less emphasis on *Tradition* (Allen *et al.*, 2000; Dietz *et al.*, 1995; Kalof *et al.*, 1999; Worsley *et al.*, 1995). Some support was also provided for the previous finding that *Power* is more important among non-vegetarians than vegetarians (Allen *et al.*, 2000), although further research is needed. Richardson *et al.* (N. J. Richardson, Shepherd *et al.*, 1994) found differences between the meat beliefs of the general population and members of The Vegetarian Society (United Kingdom), and this was also found here.

Other findings were new. In particular, differences between dietary groups' use of and trust in a wide variety of food, health and nutrition information sources were identified. Previous research had suggested that patients of alternative health practitioners were more likely to be vegetarians than patients of general practitioners (e.g. Furnham & Forey, 1994), but, to the candidate's knowledge, differences between vegetarians and non-vegetarians with respect to use of and trust in alternative health practitioners and broader sources of food, health and nutrition information had not been clearly established. The current study found that vegetarians were more likely than non-vegetarians to use media such as the Internet and health magazines, and unorthodox sources of food, health and nutrition information, and less likely to use (some) orthodox sources, some social sources and the mass media, particularly television and advertising. Vegetarians were less likely to trust orthodox sources, advertising, the mass media and social sources, but were more likely to trust unorthodox sources. It was found that vegetarians thought more about the nutritional value of the food they ate and searched more for information on healthy eating than did non-vegetarians. Semi-vegetarians tended to be intermediate between vegetarians and non-vegetarians in their responses. Thus, vegetarians and non-vegetarians appear to be part of different cultures of beliefs, practices, and communication patterns.

13.2.3 Benefits and barriers to vegetarian diets

This study appears to be the first to examine barriers to vegetarian diets and to extensively examine the benefits of vegetarian diets¹ among both meat-eaters and vegetarians. The strongest barriers to vegetarian diets for non-vegetarians were the

¹ As previously mentioned, Kalof *et al.* (1999) conducted a study that examined the demographic and personal value predictors of four benefits of vegetarianism: health, environmental, ethical and hunger. The study was published after the collection of data for the present study was complete.

enjoyment of eating meat, an unwillingness to alter eating habits, and the belief that humans are "meant" to eat meat. For vegetarians, the strongest barriers were a reduced choice when eating out, and the consumption of meat by friends and family members. For semi-vegetarians, the eating of meat by family members, reduced choice when eating out, and the enjoyment of eating meat were the main barriers to consuming a vegetarian diet.

The strongest benefits of consuming a vegetarian diet for non-vegetarians were increased fruit and vegetable intake, decreased saturated fat intake, and weight control. For vegetarians, benefits included the promotion of animal welfare/rights, protection of the environment, and the maintenance of one's health, while for semi-vegetarians, the main perceived benefits were disease prevention, increased fruit and vegetable intake, and decreased saturated fat intake.

These findings provide important information for the promotion of plant-based diets or, instead, meat. A focus on tasty, healthy (low saturated fat) plant-based meals, possibly including meat substitutes, may appeal to non-vegetarians. Alternatively, meat could be promoted by concentrating on its taste qualities and emphasising that it is possible to combine lean meat with plenty of vegetables to produce a tasty, relatively² low fat meal.

² Compared to meals with a heavier meat component, particularly if it is not lean meat.

13.2.4 Factors associated with meat consumption and beliefs about meat and vegetarianism

A number of factors explained substantial proportions of the meat consumption and dietary beliefs variance. For all respondents, between 31% and 72% of variance was accounted for. The latter figure, for the prediction of meat consumption, is unique, as most studies have predicted less than 30% of food consumption (e.g. Baranowski *et al.*, 1999) (as discussed in Chapter 6). With regard to the dietary groups, the least variance was accounted for among non-vegetarians (range: 14%-30%), with more accounted for among semi-vegetarians (38%-67%) and vegetarians (16%-64%). Thus, it appears that the items measured in the questionnaire were more successful at predicting the behaviour and beliefs of vegetarians and semi-vegetarians rather than non-vegetarians. This implies that the factors that predict meat consumption and meat and vegetarianism beliefs are less well understood among non-vegetarians. Nevertheless, reasonable results were still obtained for non-vegetarians.

A variety of factors were found to be associated with meat consumption, some of which have previously been established by other studies. For example, meat appreciation, the belief that meat is healthy, and the diet of significant others were found to be important predictors of meat consumption, in concurrence with previous research (N. J. Richardson *et al.*, 1993; Sapp & Harrod, 1989; Worsley & Skrzypiec, 1998a; Zey & McIntosh, 1992). In addition, the presence of children less than 18 years old in the household was a positive, though weak, predictor of meat consumption, as was also found by Worsley and others (Worsley *et al.*, 1993; Worsley & Skrzypiec, 1998a). Traditional values were found to be positively associated with meat consumption, while universal values were negatively associated,

in concurrence with Dietz *et al.* (1995), Allen *et al.* (2000), and Worsley *et al.* (Worsley *et al.*, 1995; Worsley & Skrzypiec, 1997). Women focused more on health factors than men did, in agreement with previous research (Fagerli & Wandel, 1999; Kemmer *et al.*, 1998; Warde & Hetherington, 1994). Demographic items were not found to be strong predictors overall, although demographics were directors of attitudes and consumption. This was also observed by Worsley and Skrzypiec (1998a).

Some of the findings of the factors associated with meat consumption were new. Although research has shown that perceived benefits and barriers to health and dietary behaviours are important influences on behaviour (e.g. McIntosh *et al.*, 1996; Rosenstock, 1974; Wolinsky, 1980), the benefits and barriers to vegetarian diets had not been examined before, with the exception of the four benefits examined by Kalof *et al.* (1999) (as mentioned above). To the candidate's knowledge, no research has previously been conducted on their associations with meat consumption as such.³ Therefore, the finding that perceived barriers to vegetarian diets were important positive predictors of meat consumption is unique. In contrast, and contrary to expectations, perceived benefits of vegetarian diets were found to be unrelated to frequency of meat consumption.

Trust in and use of mass media and advertising were expected to be positive predictors of meat consumption, as this was suggested by the results of the qualitative study. Indeed, this was found to be the case. The use of social sources was found to

³ The study by Kalof *et al.* (1999) examined the association between four benefits of vegetarianism and the behaviour of vegetarianism, not level of meat consumption. They found that the environmental benefit was the only benefit that was associated with vegetarianism at a statistically significant level.

be associated with meat consumption, although it was not incorporated in hypothesis 2 since there was no previous research to suggest that it may be a predictor. However, the influence of significant others (in the present study, the proportion of vegetarian friends) on meat consumption has been shown, as mentioned above, and it is likely that these factors are related. To the candidates' knowledge, no work by other researchers has been conducted on sources of food, health and nutrition information as predictors of meat consumption; therefore these are new findings.

It was found that there were differences between sex, age and dietary groups with respect to the predictors of meat consumption. Health concerns about vegetarian diets were most important for women, and young and middle-aged people, while having a lower proportion of vegetarian friends and holding the belief that meat is necessary were most important for men and older people, respectively. For non-vegetarians, the main factors associated with meat consumption were cohabitation, the appreciation of red meat, and the rejection of the view that meat causes cancer and heart disease. For semi-vegetarians, the relevant predictors were trust in advertising and mass media, red meat appreciation, and lack of knowledge about vegetarian diets. For vegetarians, rejection of universal personal values and the belief that meat is necessary were the only predictors of meat consumption. Thus, the characteristics of members of different dietary, sex and age groups are important to consider if attempts are made to influence meat consumption. This will be discussed in the subsequent section of this chapter (13.3 Implications of results).

Hypothesis 2, concerned with the predictors of meat consumption was, on the whole, corroborated.⁴ Overall, barriers to vegetarian diets, beliefs about meat, and proportion of vegetarian friends were the most important predictors. However, as discussed above, a demographic variable (cohabitation), an information source factor (trust in advertising and mass media sources of food, health and nutrition information), and a personal value factor (universalism) were most important for non-vegetarians, semi-vegetarians, and vegetarians respectively.

With regard to the predictors of meat and vegetarianism health beliefs, hypothesis 3 was generally supported. While there were a few exceptions⁵, most of the predictors of the four health-related sets of beliefs corresponded to the direction predicted by hypothesis 3. These analyses and findings are unique and therefore cannot be discussed in relation to previous knowledge, except insofar as they relate to research that has been previously conducted on (a) the predictors of meat consumption, since beliefs are related to behaviour, and (b) differences between the personal values and

⁴ The exceptions were that the use of or trust in orthodox and unorthodox sources of food, health and nutrition information were not predictors of meat consumption, nor were power-oriented values and perceived benefits of vegetarian diets. In addition, values were strong predictors for one group, namely, vegetarians, when values were expected to be weak predictors only.

Note that this hypothesis was not entirely supported for each separate dietary or demographic group, but only when the regression results were considered overall, that is, when all respondents, the three dietary groups, and the age and sex groups were considered together. This is also applicable to the subsequent discussion on hypothesis 3.

⁵ The most important exceptions are listed here, although they have been discussed in the results chapters. *Meat is Necessary*: for non-vegetarians, *Meat is Not Healthy* was a *positive* predictor, while, among vegetarians, *Red Meat Appreciation* was a *negative* predictor of this belief. *Vegetarianism Health Concerns and Appreciates Meat*: non-health related barriers to vegetarian diets (*Lack of Knowledge and Convenience re Vegetarianism*, *Social Influences Against Vegetarianism* and *Social Concerns about Vegetarianism*) were, in most cases, *negative* predictors. *Meat is Unhealthy: Social Concerns about Vegetarianism* and *Red Meat Appreciation* were *positive* predictors for non-vegetarians and vegetarians respectively. *Health Benefits of Vegetarianism*: the perceived non-health benefits of vegetarianism (*Peace and Contentment Benefits of Vegetarianism* and *Animal Welfare, Environmental and Hunger Benefits of Vegetarianism*) were *negative* predictors for all respondents, non-vegetarians and vegetarians, while the barrier to vegetarianism, *Lack of Knowledge and Convenience re Vegetarianism*, was a *positive* predictor for non-vegetarians and all respondents.

beliefs of non-vegetarians and vegetarians.⁶ This more indirectly related previous research has been discussed elsewhere in this thesis (Chapter 1 and Chapters 5-10).

Due to the lack of relevant research on the predictors of meat and vegetarianism beliefs among the population, including various dietary groups, the hypotheses proposed in Chapter 2 were necessarily broad. For example, hypothesis 3 gave no indication of the strength of the predictive power of any of the subhypotheses. However, this research has identified the predictors of health-related meat and vegetarianism beliefs and the relative importance of these predictors among vegetarians, non-vegetarians and semi-vegetarians, as reported in the relevant results chapters (Chapters 7-10). These results may serve as a base for any future research that is conducted in this area. It established that number of vegetarian friends and family were not important predictors of meat and vegetarianism beliefs for the dietary groups, information sources were of comparatively weak importance, and personal values were of intermediate importance, while of most importance were other (health and non-health) beliefs about meat and vegetarianism, including benefits and barriers to vegetarian diets. Furthermore, with regard to items identified as predictors that were *not* incorporated in the hypothesis, demographic items and general nutrition beliefs and behaviours were of intermediate importance, while recall of the promotion of meat and vegetarianism was of weak importance.

⁶ The study by Kalof *et al.* (1999) is also relevant, but it examined demographic and personal value predictors of one health-related benefit of vegetarianism item only, and has been discussed elsewhere (in particular, at the beginning of Chapter 10).

Therefore, for those who wish to increase the consumption of plant-based diets among non-vegetarians, such as the vegetarian diet, it may be necessary to concentrate on the following points when planning interventions or marketing campaigns:

- The tastiness of plant foods needs to be emphasised. The provision of tasty meat substitutes, together with stronger promotion of those that already exist, may be important.
- The association between diets that are low in plant foods and high in meat with certain diseases, such as heart disease, needs to be emphasised.
- Well-planned vegetarian and other plant-based diets are nutritionally adequate (e.g. they provide adequate iron and protein).
- Vegetarian diets can provide both health and non-health (particularly animal welfare, environmental and hunger-related) benefits.
- The public (particularly certain sections of the population) requires more information on how to prepare quick and easy plant-based meals.
- It is necessary to combat social concerns about vegetarianism among some sections of the population (e.g. among those non-vegetarians who believe that meat is unhealthy). One way to help overcome these concerns may be to inform people that vegetarianism actually has a positive image for many people (e.g. about 40% of the general population is interested in vegetarianism and only 7% of the general population believe that vegetarians are "hippies" or "weirdos", as reported in Appendix 7).

Alternatively, for those who wish to increase (or maintain) the consumption of meat (e.g. amongst those at greatest risk of nutrient deficiencies, such as the elderly (American Dietetic Association, 2000; Russell, 2001; Shatenstein, Kergoat, & Nadon,

2001; Wahlqvist, Savage, & Lukito, 1995)), an emphasis on the easily obtainable protein, iron and other nutrients from meat, and the convenience and good taste of meat is important. Information on the preparation of quick, economical, relatively low fat meat dishes (combined with vegetables) would also be useful. In addition, animal cruelty, environmental and health (i.e. saturated fat content, disease links) issues associated with meat may need to be confronted.

13.2.5 Information source factors associated with meat consumption and meat and vegetarianism beliefs

Frequency of use of and trust in information sources were found to be associated with meat consumption and health beliefs about meat and vegetarianism. Information sources were strong predictors of meat consumption and meat and vegetarianism beliefs for the total group of respondents (final R square ranged from 26% to 49%), with the exception of *Health Benefits of Vegetarianism*, where only 6% of variance was accounted for. However, the predictive ability of information sources was lower when respondents were split into dietary groups. They were relatively poor predictors for non-vegetarians (range: 2%-6%), better for vegetarians (10%-16%), and strongest for semi-vegetarians (15%-33%). Semi-vegetarians may be relatively undecided about the status of meat, compared to the more resolved states of vegetarianism and non-vegetarianism, and therefore information sources may be a useful guide to action and beliefs.

There were four key groups of information sources associated with meat consumption and beliefs about meat and vegetarianism. These were: (1) orthodox sources; (2) unorthodox sources; (3) mass media and advertising; and (4) social sources. In

addition, *Use Specialised Media B* (dominated by articles in sports and science magazines) was an important predictor of meat consumption for vegetarians.

The results concur with hypothesis 2, as use of and trust in mass media, advertising and orthodox sources were positive predictors of meat consumption, while use of and trust in unorthodox sources were negative predictors. Hypothesis 3 was also justified, since use of and trust in orthodox sources, mass media and advertising⁷ were positive predictors of positive beliefs about meat and negative beliefs about vegetarianism, while use of and trust in unorthodox sources were negative predictors.

The strong impact of social sources of food, health and nutrition information - a factor that was not incorporated in the hypotheses - is interesting. This could mean that any pro-meat information from the mass media, orthodox or other information sources is being filtered through friends and family, or that ingrained, more traditional beliefs about meat are being imparted from friends and family. It is also possible that a combination of the two may occur.

There were some differences in the information source predictors of meat consumption and meat and vegetarianism beliefs between the dietary groups. As discussed in Chapter 11, the strongest difference was that use of, or trust in, mass media and advertising was not a predictor of meat consumption or any meat or vegetarianism belief for vegetarians, whereas these sources were predictors for both non-vegetarians and semi-vegetarians. Therefore, it was posited that the communication of messages via mass media or advertising would be unlikely to

⁷ Of note is that only *trust* in advertising and mass media, not *use*, was a predictor.

influence the beliefs or behaviour of vegetarians. However, specialised media such as sports and science magazines may perhaps be utilised to influence the behaviour of vegetarians. These sources were not predictors of behaviour or beliefs for non-vegetarians or semi-vegetarians. With regard to similarities between the dietary groups, it was found that orthodox and unorthodox sources and social sources were predictors for all three groups for various beliefs. Thus, these sources may be useful for the promotion of meat or plant-based diets (to be discussed in the subsequent implications section).

This thesis has confirmed that trust in and use of certain information sources are associated with particular beliefs and behaviours, as some previous research has suggested (e.g. Freeland-Graves, Greninger, Graves, & Young, 1986; Hamilton, 1993; N. J. Richardson, Shepherd *et al.*, 1994). It has also expanded the knowledge about this area, as it is the first study, to the candidate's knowledge, that has examined the association between meat and vegetarianism beliefs and information sources to such an extent.⁸ A major contribution of this study is that it has examined the level of use and trust in food, health and nutrition information sources as predictors of specific diet-related beliefs and dietary behaviours. The results indicate the importance of the provision of *accurate* meat and vegetarianism information by these sources, as such information may influence the beliefs and behaviour of the population. Further research is required to verify and extend these novel findings.

⁸ One study that has touched on this issue examined beliefs and attitudes specifically relating to vegetarianism among vegetarians, orthodox and unorthodox health professionals (Helman, 1988). This Australian study found that orthodox primary care medical doctors held the least similar beliefs and attitudes to vegetarians, with dietitians next least similar, while the beliefs of unorthodox practitioners were closest to the vegetarians (Helman, 1988). Another study, by McIntosh and others (1995), examined the characteristics of elderly people who used certain information sources to reduce their red meat consumption. For example, they found that those elderly people who believed in the efficacy of

13.2.6 Prevalence of prospective vegetarians

This thesis has identified 14% of the population as being *prospective vegetarians*; that is, they hold similar beliefs about meat and vegetarianism as vegetarians and therefore may have the potential to adopt vegetarian dietary practices. This is a unique observation; no studies to ascertain the proportion of the population with similar beliefs to vegetarians have been conducted previously, to the candidate's knowledge. It would be useful if similar studies were conducted in future, world-wide, so that comparisons could be made over time and in a variety of different regions.

The characteristics of the prospective vegetarians were examined, and compared with those of omnivores and vegetarians. Compared to other non-vegetarians, prospective vegetarians were found to differ in their meat consumption behaviour, demographic characteristics, beliefs, personal values, information seeking behaviour, and level of trust in information sources.

A significant proportion of the population (over a fifth) were found to be self-identified vegetarians, semi-vegetarians or prospective vegetarians. Since the major barrier to vegetarianism for prospective vegetarians was enjoying eating meat and the majority perceived the consumption of a vegetarian diet to have important health-related benefits, it may be assumed that a plant-based diet with some meat is probably going to be more acceptable than the stricter vegetarian plant-based diet. Due to the health benefits associated with high consumption of plant foods combined with low meat consumption, the identification of a significant proportion of the population as

health foods were more likely to have stated that doctors and the mass media influenced their decision to reduce meat consumption. Thus, the current study is of a broader nature than that of McIntosh's.

prospective vegetarians has important public health implications. Some of these implications will be discussed in the following section.

13.3 IMPLICATIONS OF RESULTS

13.3.1 Health implications

This study has important implications for public health. Vegetarian diets provide health benefits, such as a reduction in the risk of cardiovascular disease (see Chapter 1). However, there may also be a risk of not meeting the requirements for certain nutrients, such as iron and zinc, if the vegetarian diet is not well planned. This study has provided an in-depth examination of some of the beliefs and issues surrounding vegetarianism and meat, with the emphasis on health beliefs, and the information sources that are associated with them. These may help to effectively promote plant foods or meat.

For example, the information provided by this thesis may be used to help to improve the diets of vegetarians. About a quarter of vegetarians believed that they needed to make some dietary changes, as they were not eating healthily enough. In addition, 14% stated that they need more information about vegetarian diets, as reported in Chapter 5. Vegetarians need to be encouraged to eat a well-planned diet with sufficient intake of nutrients, particularly iron, zinc and vitamin B-12, and for this they will need appropriate information. Changes to the socio-environment, such as a greater choice of healthy vegetarian meals when eating out, may also benefit vegetarians' health (31% stated that their choices when eating out are too restricted). However, very few vegetarians (4% or less) agreed that there is not enough iron or protein in vegetarian diets or that they were worried about their health due to being

vegetarian (although slightly more were unsure). This could mean that they believe there is nothing intrinsically unhealthy about vegetarian diets, but it is still possible to eat a vegetarian diet that is not as healthy as it could be, as it is for any type of diet. The vegetarians in this study may already be eating a diet that is reasonably well planned enough to ensure sufficient nutrients, or they may disagree that nutrient deficiencies are ever a problem for vegetarians. This is an area for future research. If the latter were found to be the case, education about the possible risks of deficiencies in some nutrients would be required.

This study also has broader implications than simply for vegetarianism, as the findings may also be applicable to plant-based diets in general. Plant-based diets that contain small amounts of meat have also been found to provide health benefits (e.g. Dwyer, 1999), and are likely to be more acceptable to a greater portion of the population than the stricter, vegetarian diet. It is possible that the 13.5% of the population who were identified as prospective vegetarians and the further 7.2% as semi-vegetarians may be more amenable to the consumption of a plant-based diet that contains some meat than to a vegetarian diet.

This thesis has explored people's cognitions with regard to the issues of meat and vegetarianism, particularly by the identification of the factors associated with meat consumption and positive and negative beliefs about meat and vegetarianism. The next step is for this knowledge to be implemented in order to encourage attitudinal and, subsequently, behavioural change amongst consumers. The factors identified in this thesis are the areas that presumably are of high personal relevance (with respect to meat and vegetarianism) to certain segments of the population, namely,

vegetarians, semi-vegetarians, and non-vegetarians, including prospective vegetarians. This is important because the information provided by health professionals needs to be pertinent to the experiential and cognitive schemas of consumers, so that the likelihood of knowledge absorption and behavioural change is increased (Worsley & Scott, 2000). This is a *market segmentation* approach to nutrition education, whereby the focus is placed on individuals by offering them relevant, tailored and persuasive messages (Green & Kreuter, 1992). Audiences can be segmented according to demographic, psychographic, geographic, and behavioural variables (Maibach & Holtgrave, 1995). Thus, the findings reported here provide a solid base for the tailoring of dietary communications about meat and vegetarianism according to people's dietary behaviours, cognitions or schemas, so that they are more likely to incorporate and act on these communications. For example, to increase the consumption of plant-based meals among those non-vegetarians who are already aware of health benefits associated with vegetarian diets, it may be important to provide information about how to prepare quick and uncomplicated, nutritionally adequate meat-free meals. Such messages would also need to tap into the concern of these individuals that their current diet is not as healthy as it could be. In addition, the identification in this thesis of prospective vegetarians and their characteristics may be useful for promoters of meat, plant foods, or vegetarianism. For example, dietary messages may need to appeal to their strong personal values of environmental protection and enjoyment of life.

One method of altering people's behaviour via their beliefs and values is *values self-confrontation* (Rokeach, 1973; Schwartz & Inbar-Shan, 1988). This technique aims to modify behaviour by changing the priority of the values that lie beneath that

behaviour. It has been used successfully to increase weight loss (Schwartz & Inbar-Saban, 1988), decrease smoking rates (Conroy, 1979), and enhance pro-environment behaviour (Ball Rokeach, Rokeach, & Grube, 1984). Furthermore, a recent study employed values self-confrontation to alter beliefs about meat, fruits and vegetables. Participants altered their beliefs and increased their consumption of fruits and vegetables when confronted with the results of a previous study, which suggested that hierarchy and dominance are positively associated with meat, but negatively associated with fruit and vegetables (Allen & Baines, 2001). Values self-confrontation may therefore be a useful method for influencing the consumption of meat and plant foods. It has been used through the mass media (Ball Rokeach *et al.*, 1984; Grube, Mayton, & Ball-Rokeach, 1994) and therefore has the potential to reach large numbers of people.

A factor that may increase the effectiveness of the targeting of information is *how* the information is delivered, that is, through which particular information sources. The most appropriate channels for message dissemination need to be identified. The level of usage and credibility of sources of information were a focus point in this study in order to identify the most effective ways to disseminate messages about plant-based diets to the public. The sources that are highly used and trusted by those with certain beliefs about meat and vegetarianism or levels of meat consumption have been identified, and these may be the most appropriate mechanism through which the relevant information can be delivered. For example, relationship marketing and messages disseminated via the mass media could be important channels for influencing meat consumption among non-vegetarians.

However, information distribution alone is not sufficient for dietary change (unless it can overcome psychosocial, behavioural and socio-environmental barriers) (Nestle *et al.*, 1998; Vaandrager & Koelen, 1997). Behaviours such as food choice are influenced by the complex interaction of demographic, social, cultural, biological, psychological, socio-environmental and policy variables (Booth *et al.*, 2001; Forsyth, MacIntyre, & Anderson, 1994). Therefore, as an example, education-based strategies such as mass media promotion of healthy foods need to be supported by socio-environmental modifications (Booth *et al.*, 2001). This thesis has highlighted, or the results suggest, some socio-environmental changes that may need to be made before change can occur, or that will help to maintain change. For example, if one's aim is to increase the consumption of plant-based meals, there may need to be more meat-free meal options available at restaurants and cafés. This may particularly influence those non-vegetarians who already hold some positive beliefs about vegetarian diets and those semi-vegetarians with comparatively high meat consumption. As the enjoyment of eating meat was a positive predictor of meat consumption for non-vegetarians and semi-vegetarians, and also for non-vegetarians who had health concerns about vegetarian diets, it is possible that tactics such as more prominent positioning of meat substitutes in supermarkets may have some impact (Culverwell & Eder, 1982).

One strategy that could facilitate socio-environmental changes, such as those mentioned above, and that could enable other changes supportive of plant-based diets to be made, is the development of partnerships between the community, local councils, government, the retail and food service sector (such as supermarkets and restaurants), agricultural sector, health and social professionals, neighbourhood groups, schools, universities, and the media. Such coalitions are a way to strengthen

and advance food and nutrition agendas and are a feature of many health promotion endeavours (Economos *et al.*, 2001; Green & Kreuter, 1992; Milio, 1990). For example, coalitions of educators, researchers, government and industry have shown success in reducing smoking rates at the population level (Economos *et al.*, 2001). Community-wide programs "can reach large numbers of people through mass media and multiple channels of communication, build widespread normative, economic, and political support for the changes, and possibly stimulate change in a community's policies and social fabric" (Green & Kreuter, 1992, pg. 143).

Socio-environments and policies to support behaviour change need to be combined with motivational and educational programs to encourage healthy eating (Booth *et al.*, 2001; Glanz *et al.*, 1995; Vaandrager & Koelen, 1997). A multi-level approach to strategies to change behaviour such as this are important for change to occur at the individual, social and cultural, socio-environmental and policy levels (Booth *et al.*, 2001). This thesis suggests that both market segmentation and community intervention should be involved in the promotion of plant-based diets such as the vegetarian diet. People need to be targeted in accordance with their current meat and vegetarianism-related beliefs and, furthermore, their beliefs and values need to be shaped if the consumption of vegetarian and other plant-based diets is to increase. However, it is also true that, for example, vegetarian and other plant-based foods need to be more readily available when eating out, and more accessible information about vegetarian diets is required - that is, a more supportive socio-environment generally is needed.

Significant others are a notable aspect of the socio-environment, as they play an important role in food choice. In particular, the awareness that other people have successfully switched to consuming a plant-based diet appears to be important. For example, vegetarian friends and family were associated with negative beliefs about meat and reduced meat consumption, while the use of friends and family members as a source of food, health and nutrition information was associated with positive meat beliefs and increased meat consumption. This emphasises the importance of social networks, in which one person has the potential to influence, and be influenced by, many (Phillips, 1999). Thus, for each person who wants to become vegetarian, there are other consumers who also may be influenced. Presumably this would also be relevant for increased intakes of plant foods and decreased intakes - but not total avoidance - of meat.

13.3.2 Environmental and food sustainability issues

The consumption of a vegetarian diet may be perceived to have benefits, such as public health improvements and sustainability of the environment, including food security. The consumption of a vegetarian diet in developed countries may result in an increase in the diversity of foods consumed (Register & Sonnenberg, 1973; Sanders, 1999), which consequently may encourage biological diversity. It has been noted that conventional agricultural methods have ravaged the Australian environment (Coveney & Santich, 1997). Soil erosion, salinity, nutrient loss, and a decrease in biodiversity are some of the problems that have resulted (Australian Bureau of Statistics, 2001a, 2001b; Fray, 1991). As examples, about 2.5 million hectares of land in Australia are affected by salinity, with many more hectares at risk, and in 1999 about 20% of Australian farmers experienced some form of land degradation

(Australian Bureau of Statistics, 2001b). There is widespread support for urgent measures for agricultural sustainability from the food and nutrition system in Australia, including farmers, nutritionists and food safety personnel (Worsley & Murphy, 1994). Perhaps support is now most urgently required from consumers, through their dietary choices.

A concerted effort is required to reduce the negative impact of modern intensive agriculture on the environment. The environmental impact, as well as the health impact, of certain foods and diets needs to be considered when making food choices (e.g. organic vs. non-organic, excessively packaged vs. minimal/no packaging, highly processed vs. minimal/no processing, high meat diet vs. minimal/no meat diet). Public health professionals can play an important role in facilitating attitudinal and behavioural changes such as this. Studies have shown that the public is concerned about the environment (e.g. Mertig & Dunlap, 2001; Uyeki & Holland, 2000), but it is possible that they are not as aware of the impact of agriculture on the environment as they are about industrial pollution, wildlife conservation and so on. For example, this study found that there was relatively low, although not insignificant, agreement of the randomly selected respondents with the statements that vegetarianism can help the environment (22%) and increase the efficiency of food production (15%). Of note is that a higher proportion of respondents were unsure about whether they agreed or disagreed with these statements (35% and 43% respectively); these people may be more readily influenced than those who have already made a decision. Other studies have found strong public support for protection of the environment in general (e.g. Mertig & Dunlap, 2001; Uyeki & Holland, 2000). An Australian survey conducted in 1999 found that 68% of adults stated that they were concerned about environmental

problems (Australian Bureau of Statistics, 2001b). Surveys of Western Europe and the United States found that 97% and 95% of the pooled sample strongly or somewhat approved of environmental and wildlife protection, respectively (Mertig & Dunlap, 1995).⁹ In addition, support for animal rights was found to be high, with 81% of the pooled European and United States sample indicating that they strongly or somewhat supported animal rights (Mertig & Dunlap, 1995).¹⁰ Support for wildlife and environmental protection was found to be strongly connected to support for the goals of abolishing nuclear power plants, nuclear disarmament, women's rights, human rights, and animal rights (combined into a composite measure) (Mertig & Dunlap, 2001). Thus, these issues form an ideologically interrelated set of concerns. Indeed, it has been suggested that the increase in the prevalence of vegetarianism is symptomatic of a broader societal shift towards the view that nature should be protected rather than exploited by humans (Fiddes, 1991). However, the majority of the population does not appear to perceive this link, or at least, if it is seen, it is not translated into action.

Nonetheless, data from this thesis suggests that a considerable portion of the South Australian population (22.2%) is likely to identify links between food choices (specifically, meat), the environment and animal welfare. Prospective vegetarians,

⁹ The mean responses for the pooled sample were 4.75 and 4.65 for environmental and wildlife protection respectively (where 5="strongly approve", 4="somewhat approve", 3="neither" or "don't know", 2="somewhat disapprove" and 1="strongly disapprove") (Mertig & Dunlap, 1995).

¹⁰ The mean response for the pooled sample was 4.20 (Mertig & Dunlap, 1995). These figures may seem high considering the proportion of vegetarians in these countries is much lower than the proportion who at least somewhat support animal rights. It appears that such support may, currently, be more theoretical than practical. It is possible that respondents focused more on non-food animals such as pets and wildlife, or animals used for cosmetic or medical testing, in their consideration of what "animal rights" means, or, if they did also consider food animals, were in support of improving animal welfare rather than in support of not killing animals for food or being against intensive livestock farming methods. It would be interesting to examine the public's perception of what the term "animal rights" means. Nonetheless, the figures presumably indicate strong awareness of and support for the

semi-vegetarians and vegetarians were not only found to be more highly health-oriented but were also more likely than the remainder of the population to be concerned about the environment and the animal welfare and environmental implications of meat production. They also ate red meat less often than the remainder of the population. The presence of prospective vegetarians in particular may provide additional evidence for the proposed societal shift towards more universal, particularly environmental, values (e.g. Buisson & Garrett, 1996; Dunlap & Van Liere, 1978; Fiddes, 1991; Herrera, 1992; Mertig & Dunlap, 2001; Rozin *et al.*, 1997) , although a longitudinal survey would be necessary to confirm this. The increased interest in and consumption of organic foods over recent years (Coriolis Research, 2000; A. James, 1993; G. Lawrence, Lyons, & Lockie, 1999; Lockie *et al.*, 2001; Lyons, 1999; Monk, 1999; Spezzano, 1999) may be a trend related to this shift and to vegetarianism (e.g. see Buisson & Garrett, 1996; Hamilton, 1993; G. Lawrence *et al.*, 1999; Miele, 1999). It is important that public health professionals are aware of such trends and consumer beliefs. Prospective vegetarians may make ideal targets for dietary messages that incorporate not only health, but also broader ethical issues such as the environment.

The incorporation of environmental issues into dietary messages may, by increasing awareness of links between food and the environment, result in improved health by appealing to those who may not necessarily be interested in their own personal health, but are concerned about the environment (McNutt, 1990). Thus, such messages may have more success in reaching a larger portion of the population and have the potential to help the environment and improve public health simultaneously. The

rights of at least some species (or animals in certain situations), which should be encouraging for the

findings of this thesis support this strategy. The results imply that those who perceive there to be health benefits associated with vegetarianism are not necessarily those who perceive there to be animal welfare, environmental, hunger or other non-health related benefits.¹¹ Thus, separate groups of people may be reached by a strong message that links meat/plant-based diets and the environment. Furthermore, those non-vegetarians who perceive there to be health benefits associated with vegetarianism may be more likely to become vegetarian if they were to become aware of the non-health related benefits. More research is needed on this area.

It is worth noting that the goals of the environmental, sustainable food production, animal welfare and public health movements may *all* be partially achieved by consumers choosing a plant-based diet (e.g. Cannon, 1999).

13.3.3 Equity issues

Even if one is (a) unconcerned with or does not agree that modern meat production techniques have a negative impact on the environment and (b) unconcerned by the animal welfare issues surrounding the use of animals for food, there is another ethical issue that may be relevant - that of hunger and nutrient deficiency. About 14% of the random population sample agreed that consuming a vegetarian diet could help decrease hunger in the Third World (see Table 6 in Appendix 7). This shows that a significant minority of the population link food choice (specifically, meat) to

vegetarian movement.

¹¹ The relevant result is that reported in Chapter 10, whereby animal welfare, environmental and other non-health benefits of vegetarianism were negative (albeit relatively weak) predictors of *Health Benefits of Vegetarianism* among non-vegetarians and vegetarians. This is supported by survey results reported in Appendix 13, namely the predictors of *Animal Welfare, Environmental and Hunger Benefits of Vegetarianism* for non-vegetarians and vegetarians; *Health Benefits of Vegetarianism* was a negative predictor, ranking third for both dietary groups. Note, however, that those non-vegetarians

hunger.¹² At present there is sufficient food available to feed the world's population (Uvin, 1994). However, it is estimated that about 20% of the inhabitants of developing countries, or about 800 million people, are energy deficient and more than 2 billion people world-wide suffer from a micronutrient deficiency, such as a lack of iron (Food and Agriculture Organization, 1996; Uvin, 1994). This is due to the available food not being equitably distributed. One argument that can therefore be made is that some of the relatively large quantity of meat available for consumption in Western countries such as Australia should be redistributed to those in the Third World who are in need of additional energy and nutrients. Meat and offal forms 19% of the average per caput dietary energy supply in Australia (14% for industrialised countries as a whole), whereas for those in the least developed countries these foods form only 2% of dietary energy supply (1990-1992 figures) (Food and Agriculture Organization, 1996). Thus, it may well be argued that countries such as Australia could have an important role in alleviating the problem of hunger in the Third World by providing meat as a form of nutrient-dense foreign aid. This strategy would not, of course, solve the structural conditions responsible for such inequities (Koc, MacRae, Mougeot, & Welsh, 1999), but could be part of a solution.

13.3.4 The future direction of public health

There is a growing realisation that the public health movement needs to encompass a broader range of issues than it has traditionally been concerned with - there is a need "to create a new intellectual and social base for public health" (P. James, 1998, pg. 416). Food and nutrition has already become a topic of strong importance to public

who agree that meat *per se* is unhealthy perceive there to be health *and* non-health related benefits of vegetarianism (as reported in Chapter 9).

health, which is commendable, although in some countries such as the United Kingdom, it appears that diet is not as intrinsic to public health as it should be (P. James, 1998). However, broader food-related issues of food sustainability and the environment should not be divorced from health. The food system impacts on both health and the environment; unsustainable food production and distribution methods cannot ensure an adequate future supply of good-quality, healthy foods to promote the health of the public (Lang, 1999b). Indeed, the Public Health Association of Australia has recently been actively involved in increasing awareness of food sustainability and the ecological impact of food production, through their 3rd National Food and Nutrition conference.¹³ This followed on from an earlier conference held in Adelaide¹⁴, which was the first Australian conference to have the interrelationships between food, health and the environment as its theme. The National Health and Medical Research Council has mentioned the important environmental issues that Australia faces, such as salinity and the loss of top soil, in the preface of the draft Dietary Guidelines for Australians (National Health and Medical Research Council, 2001), which is a positive step. However, this acknowledgement has not been followed through in the document; there is no other mention of environmental issues and none at all of how food choices could help to ameliorate these problems. Some overseas organisations, such as the American Dietetic Association and the World Cancer Research Fund, and individuals such as Tim Lang and Nancy Milio have also recognised the importance of the larger issues such as hunger, equity, self-sufficiency, and environmental sustainability in the health arena (American Dietetic Association,

¹² Furthermore, the Meat Consumption Score and "Decrease hunger in the Third World" were found to be negatively correlated ($r = -0.55, p < 0.01$).

¹³ *Eating Well into the Future*, held in July 2001 in Melbourne.

¹⁴ *Eating into the Future*, held in April 1999. This conference had different organisers to *Eating Well into the Future*.

1995, 1996; Johnson, Eaton, Wahl, & Gleason, 2001; Lang, 1998, 1999a, 1999b, 1999c; McNutt, 1990; Milio, 1990; World Cancer Research Fund & American Institute for Cancer Research, 1997). This is a promising beginning, but efforts need to be made to ensure that these sentiments are carried through and developed to a greater extent than they have been. More research on the environmental beliefs and concerns of consumers and how they may relate to dietary behaviour needs to be conducted (I. Contento *et al.*, 1995). This is also true for animal welfare issues; awareness of this area appears to be even lower than for environmental issues, and seems to be restricted to individual comment in peer-review journals and other such sources. Yet, the discipline of public health may need to consider such issues more thoroughly, as they have some impact on public health via meat and plant-food consumption. World hunger issues have traditionally been in the arena of public health, which provides some encouragement that other equity and environmental issues may also be incorporated more fully in the future. It has been suggested that it would be beneficial if issues of health and public health, the environment, social justice, animal welfare, and consumer issues were strongly welded, in order to provide a solid base for a single, overarching message (Lang, 1999c).

13.4 LIMITATIONS OF THE STUDY

The telephone directory (Marketing Pro) was used to select participants for the random population survey. Telephone directories do not contain a list of *all* inhabitants of a particular area, such as South Australia. Nonetheless, using the telephone directory resulted in good representations of age groups and other demographic characteristics. The main exception was the lower than expected proportion of young people under 24 years of age, which is important since younger

age groups are more likely to be vegetarian (e.g. Australian Bureau of Statistics, 1997; Vegetarian Society UK, 1991).¹⁵ This research had limited funding, and hence it was not possible to use the electoral roll to select the sample. However, the electoral roll is also not entirely comprehensive, as those ineligible to vote, those who are not registered and those who neglect to notify that their address has changed are excluded. Thus, in particular, the young, migrants and the more mobile are underrepresented (Evans, Booth, & Cashel, 2000). In addition, the electoral roll was not as current as the Marketing Pro phone directory, and hence a number of people (again, particularly young people) may have been expected to have changed their address. Therefore, given the financial restrictions, the telephone directory was suitable for the selection of participants.

Another possible limitation of surveys is that the response rate is almost inevitably less than 100 percent, and hence the respondents may not be representative of the population as a whole. The lower the response rate is, the greater the chance of a significant response bias. As a rough guide, Babbie (1989) considers a response rate of 50 percent to be adequate for analysis and reporting, 60 percent to be good and 70 percent to be very good. The response rate of the random population survey in this study was approximately 71% and hence may be considered to be very good. Other surveys conducted recently in Australia have had much lower response rates (e.g. a response rate of 42% was achieved in a random postal survey on weight control conducted in Victoria by Timperio, Cameron-Smith, Burns, & Crawford, 2000), as do some surveys from other parts of the world (e.g. a response rate of 37% was obtained in a United Kingdom survey on attitudes towards increasing fruit and vegetable

¹⁵ Therefore, the proportion of vegetarians in the South Australian population is likely to have been

consumption by Cox *et al.*, 1998). It is generally considered to be becoming more difficult to obtain good response rates, perhaps due to reasons such as excessive telemarketing, the public's lack of time, and their wariness of (perceived lack of) confidentiality. A demonstrated lack of response bias is more important than a high response rate, however (Babbie, 1989). As discussed in Chapter 4, the demographic characteristics of the random population survey sample were similar to those of the general South Australian population for the majority of comparable items.

Other biases that are associated with surveys in general include ambiguity bias and social desirability (Hebert, Clemow, Pbert, Ockene, & Ockene, 1995; Schwarz, 1999). The wording, format and context of questions may all influence the responses provided by participants (Schwarz, 1999). These types of biases are almost impossible to entirely eradicate, although steps may be taken to diminish them (Povey *et al.*, 2001). For example, the emphasis on the anonymity of the *Food Choice, Information and Your Attitudes* survey respondents is likely to have reduced the number of responses made in accordance with social desirability considerations.

Due to financial and time reasons, it was not possible to randomly survey a large enough sample of the general population to give an adequate number of randomly selected vegetarians for statistical purposes. This is a limitation of the thesis, but was necessary under the circumstances since, assuming the proportion of vegetarians to be 1.5% as was found in the random population survey, about 7000 members of the general population would have needed to participate in order to provide a sample of about 100 vegetarians (for example). It is difficult to obtain a random sample of

underestimated by this survey.

vegetarians without the necessary money, and thus a non-random sample was obtained. However, the non-random sample displayed a reasonably broad range of demographic characteristics, which were somewhat similar to the characteristics of the random population sample, as was shown in Chapter 4.

The number of semi-vegetarians included in the study was limited ($n = 55$) and therefore possibly not representative. However, despite this, a wide range of meat consumption levels and beliefs about meat and vegetarianism was present in this research. An interesting future study could look more specifically at self-identified semi-vegetarians and how their characteristics differ to those of vegetarians and non-vegetarians.

The numerous statistically significant relationships throughout this thesis indicate sufficient sample size and adequate statistical power, with low probability of Type II error¹⁶ in the study. However, many significance tests were conducted in this study, which introduces the possibility of Type I error.¹⁷ Although $p < 0.05$ was used as the criterion of statistical significance (which is a typical alpha level and one that is generally satisfactory), many findings were of stronger statistical significance (i.e. $p < 0.01$ or $p < 0.001$). This suggests that the risk of Type I error was minimal.

The cross-sectional study design was necessary to examine current associations between people's beliefs about the healthiness of meat and vegetarianism and other factors such as personal values and trust in information sources. However, it is

¹⁶ Type II error is the "probability of incorrectly failing to reject the null hypothesis - in simple terms, the chance of not finding a correlation or mean difference when it does exist" (Hair *et al.*, 1995, pg. 2).

difficult to interpret the observed associations without a longitudinal study design that examines how people change over time. This is because it is not clear whether the various beliefs and factors such as the benefits and barriers of vegetarianism (independent variables) led to the specific health-related beliefs, such as *Meat is Unhealthy* (dependent variable), or *vice versa*. A longitudinal study could not be conducted due to time and financial reasons. However, it is one potential avenue for future research.

13.5 DIRECTIONS FOR FUTURE RESEARCH

Some promising avenues for future investigation have arisen from this research. More qualitative research would be useful in the future, particularly interviews and/or focus groups conducted with non-vegetarians. This research would extend the qualitative work conducted for this study, namely, the interviews with vegetarians.¹⁸ It could, for example, examine the reasons why participants eat meat, the factors which they believe could influence them to become vegetarian or a low meat consumer in the future, their use of and trust in information sources that promote vegetarianism and sources that promote meat, and whether they perceive vegetarians to be associated with particular stereotypes. Such work could provide a more in-depth perspective on the beliefs of non-vegetarians and would therefore add to the quantitative work conducted for this study. Extensive qualitative work among non-vegetarians and other dietary groups could also uncover any presently unknown intermediary factors that may influence beliefs about meat. This is important as the

¹⁷ Type I error is the "probability of incorrectly rejecting the null hypothesis - in most cases, this means saying a difference or correlation exists when it actually does not" (Hair *et al.*, 1995, pg. 2).

¹⁸ As noted in Chapter 3, it was not possible to conduct a larger qualitative study than the interviews with vegetarians for this thesis due to time and financial limitations.

factors that predict meat consumption and meat and vegetarianism beliefs among non-vegetarians are not as well understood as they are among vegetarians.

It would be interesting to examine the *amount* of meat that people believe is necessary or otherwise important for good health. Rozin *et al.* (1997) have examined the relative amount of meat that is considered by those reluctant to eat meat to be unhealthy (38% of the sample agreed that "even a diet that contains small amount of 'meat' is unhealthy" while 63% agreed that "a diet with at least moderate amounts of 'meat' is unhealthy"). Questions of a similar style could be asked of non-vegetarians with regard to the healthiness of meat. As mentioned in Chapter 5, it is possible that some, or perhaps many, of those who deem meat to be necessary may consider only *small* amounts of meat to be necessary.

Future research could examine more deeply each particular information source that was identified in this thesis as being associated with meat consumption and certain meat and vegetarianism beliefs, in order to elucidate the specific information about meat and vegetarianism that it provides. For example, a survey of alternative health practitioners could be conducted to examine their beliefs about meat and vegetarianism and the nutrition and dietary advice they provide to their patients.

An intervention that involved the distribution of appropriate information on vegetarianism and plant-based diets or meat to participants could examine how successful tailored information would be in influencing prospective vegetarians and other dietary groups to alter their dietary behaviour.

It would also be interesting to conduct a follow-up of participants in this study, or a separate longitudinal study, in order to identify any change in meat consumption over time. If meat consumption had changed, respondents could be asked to provide their reasons for this. Thus, it could be possible to determine whether the current beliefs and behaviours of dietary/belief groups, such as prospective vegetarians and semi-vegetarians, could predict future meat consumption and beliefs.

A useful study to conduct in the future would be one that examines more general plant-based diets, that is, ones that may or may not contain meat. Such a study could include questions not only on meat but also ones specifically pertaining to consumption of and beliefs about certain plant foods or groups of plant foods, such as grains, fruit and vegetables. One outcome of such a study could be an assessment of the validity of the assumption made in this thesis that a plant-based diet that contains some meat is likely to be more acceptable to prospective vegetarians (and others) than a stricter vegetarian diet. This proposed study would need to be larger than the current one, which was limited by time and financial resources.

More generally, research with a stronger focus on the environmental and animal welfare beliefs of the general population and how they impact on food choice is required. These aspects of food choice have been relatively neglected. As this and some other studies have shown (e.g. Coriolis Research, 2000; Lockie *et al.*, 2001; Worsley & Skrzypiec, 1997), these issues are not restricted to vegetarians, but have a wider importance. In particular, the outlook of (non-vegetarian) organic food consumers may be similar to that of vegetarians (Coriolis Research, 2000; Lockie *et al.*, 2001). These beliefs are particularly important to examine in future research as

food choices impact upon the environment, food sustainability, and on non-human animals, as well as on human health.

13.6 CONCLUSION

The knowledge of the issues involved in the choice of whether or not to eat meat provided by this thesis could help to increase the effectiveness of messages to increase consumption of plant foods, and, for heavy meat consumers, to decrease meat consumption. A deeper understanding of the determinants of dietary change has been gained. Health and non-health related beliefs about meat and vegetarianism, particularly barriers and benefits of the consumption of a vegetarian diet, were found to be important predictors of meat consumption and health-related beliefs. The use of and trust in sources of food, health and nutrition information were also of some importance, particularly orthodox and unorthodox sources, mass media and advertising, and social sources. The knowledge of the most influential sources and types of information on food choice that has been provided by this research could, if utilised, lead to improved health policy formation, more effective health promotion, and an increased level of population health. In addition, non-health issues such as the environment and animal welfare are linked to food choice, and health may be improved if these issues are addressed. The association between health and non-health issues are exemplified by the identification of over a fifth of the population as vegetarian, semi-vegetarian, or prospective vegetarian, with firm health, environmental and animal welfare orientations. The findings of this thesis suggest the need for a stronger incorporation of environmental, social justice, animal welfare and consumer issues into the roles, responsibilities and actions of the discipline of public health.

APPENDIX I

Information Elicited from Vegetarian Interviewees

DEMOGRAPHY

- Name
- Contact details
- Age
- Sex
- Ethnicity
- Religion
- Marital status
- Living arrangements (with parents, group house, with partner, alone)
- Highest education level
- Place of origin (where raised)
- Place of residence (urban, rural)
- Occupation
- Income (personal and household)

ABOUT YOUR VEGETARIANISM

- Which of these foods do you *never* eat?
 - meat (such as beef, pork, lamb, veal)
 - poultry meat
 - fish/seafood
 - eggs
 - dairy products
 - honey
- Do you eat organic foods?
- At what age did you become vegetarian? (How long have you been vegetarian for?)
- Was it a sudden or a gradual change?
- How easy/difficult was the transition to vegetarianism?
- What sources of information/types of information were used (either actively searched for or passively stumbled across) to raise awareness about vegetarianism?
- Would different or more information have helped?
- Has more information been used since the change? Specify.
- Do you have any family members/peers who are vegetarian?
- Do you find that people are generally supportive of your choice to be vegetarian (including strangers)?
- Do you think there is some sort of stigma attached to being vegetarian?
- Is there generally a positive or negative stereotype attached to vegetarians?
- So why don't you eat meat (and other animal products)?
- Is that really the only reason? (e.g. If the reason given was dislike of preparing a meal containing meat: So you still enjoy eating it even if you've been invited to dinner by friends or family then?)
- What would you consider to be your most important reason for being vegetarian...now and initially? (Or is this position shared by more than one reason equally?)
- Reasons for becoming vegetarian and for remaining vegetarian? (Is that the *real* reason?)
- Do you find meat disgusting in any way? (Is it offensive or repulsive?)
- Have you heard of any diseases/conditions linked to meat-eating and/or to vegetarianism? Do you agree that there is a link?
- Have you heard of any benefits of eating meat? Of not eating meat? Do you agree with them? (Awareness of risks/benefits of meat and animal products in diet to health and disease, such as iron, CVD, cancer, vitamin B12, obesity, dietary fat)
- Are you a member of a vegetarian society or a similar group?

KNOWLEDGE, CONTROL AND INFORMATION

- Level of nutrition knowledge (e.g. awareness of dietary guidelines and RDAs)
- Sense of control over own health and life (e.g. food safety, additives, hormones, genetic engineering; risk perception with regard to meat, dairy etc., such as BSE)
- If there was a source of meat available that was free of hazardous substances and/or was polyunsaturated, do you think you would start eating meat again?
- Media/information sources utilised generally, and for nutrition/food information, and for vegetarianism and related areas information:
 - magazines (such as *Women's Weekly*, *New Vegetarian and Natural Health*)
 - television
 - radio
 - books
 - newspapers
 - food labels
 - pamphlets
 - dietitians
 - physicians
 - unorthodox health practitioners
 - National Heart Foundation
 - Anti-Cancer Foundation
 - significant others
 - teachers
 - school/college
 - work-mates
 - health insurances
 - slimming societies
 - food company/industry/product information (e.g. Sanitarium, Meat and Livestock Australia)
 - vegetarian societies
 - health food shops and personnel
- How often are these used?
- Most useful sources...?
- Have you seen this particular advertisement...? Such as the women and iron ad, baby and meat ad, soy drink ads, dairy milk ads.
- Have you seen any television programs/advertisements mentioning meat?
- What are your thoughts about this advertisement/program?
- Had you discussed it before with anyone else?
- Level of trust in authorities/sources of information (including the above list) (e.g. attitudes towards the medical profession - Do you visit a doctor when you are ill? Do doctors have sufficient nutritional knowledge, in your opinion? Or do you use unorthodox therapies? Trust in advertisements produced by the meat industry as compared to information produced by the Vegetarian Society.)

PERSONAL VALUES

- Personal values e.g. the environment, feminism/gender issues, politics, moral: ethics and non-human animal welfare/rights (ask some questions not obviously related to vegetarianism or the environment e.g. about mistreatment of animals such as pets; human suffering in poor countries (hunger etc.) as well as more directly related ones)
- Tell me about your views on non-human animal welfare/rights.
- What are your views on human rights and human suffering e.g. hunger in the Third World?
- Do you believe in equality for men and women? Are you a feminist?
- How would you describe your political views?
- Would you classify yourself as an environmentalist? If not, what do you think about environmentalists?
- Concerned about air pollution? Hazardous waste? Population growth? Logging? Non-renewable energy sources?
- Member of an environmental group? e.g. Greenpeace, ACF, The Wilderness Society
- Member of any other group, or involved with issues such as human rights?
- Do you see any links between vegetarianism and other parts of your life/thoughts? (such as these issues)

APPENDIX 2

Information Sheet for Interviewees

INFORMATION SHEET. *Vegetarian interviews: reasons, values, and information*

Interviews with vegetarians will be carried out in order to study

- * the reasons why people become vegetarian and maintain this dietary choice;
- * the information and information sources used in becoming vegetarian and maintaining vegetarianism (with an emphasis on the mass media);
- * the values, lifestyles and world-views of vegetarians.

These interviews are part of a larger three year study on vegetarianism and information. Later research will look at the differences between vegetarians and non-vegetarians.

The project may help to identify some of the barriers to dietary change that need to be overcome to create a healthier population.

Researcher contact details

Ms Emma Lea
Department of Public Health
University of Adelaide
South Australia 5005

Email address: emma.lea@student.adelaide.edu.au
Phone numbers: work (c/- Department receptionist) (08) 8303 4637
after hours (08) 8231 1790

APPENDIX 3

Consent Form Signed by Interviewees

The University of Adelaide

CONSENT FORM

See also Information Sheet attached

1. I, _____ (please print name)
hereby consent to take part in the research project entitled:

Vegetarian interviews: reasons, values, and information
2. I acknowledge that I have read the Information Sheet entitled:

Information Sheet. Vegetarian interviews: reasons, values, and information
3. I have had the project, so far as it affects me, fully explained to my satisfaction by the research worker. My consent is given freely.
4. I have been informed that, while information gained during the study may be published, I will not be identified and my personal results will not be divulged.
5. I understand that I am free to withdraw from the project/interview at any time, and am not obliged to answer all the questions if I prefer not to.
6. I am aware that I should retain a copy of this Consent Form, when completed, and the relevant Information Sheet.

Signature/date

.....

WITNESS

I have described to _____ (name of subject)
the nature of the procedures to be carried out. In my opinion he/she understood the explanation.

Name

Signature/date

STATUS IN PROJECT

APPENDIX 4

Interviewees' Characteristics

DEMOGRAPHIC CHARACTERISTICS

The sample included eleven females and four males. Respondents were aged between 23 and 50 years (six people were aged between 23 and 30, five people were aged between 31 and 40, and four people between 41 and 50 years).

Respondents had a high level of educational attainment, with all but three either holding at least a university degree or currently studying at university (with two current postgraduate students and six current undergraduate/Honours students). The non-university educated participants all had their Higher School Certificate, with one also having TAFE qualifications. Six participants were occupied solely with university studies, while two studied part-time whilst working. One person was unemployed, with the remaining six participants occupying a variety of positions including librarian, public servant, café proprietor, and biotechnologist. In general, the students and unemployed had low incomes, with the remainder having medium-level incomes. Eight respondents were single with the remaining seven married or in a defacto relationship. Five people had children, but only three had dependent children.

TYPES OF VEGETARIANISM

The fifteen self-identified vegetarians almost covered the complete range of vegetarian dietary strictness. Two were actually semi-vegetarians (both included fish in their diets, with one also including chicken every three months); six were lacto-ovo-vegetarians (included dairy and eggs but excluded all meat and fish); one was lacto-vegetarian (included dairy but excluded eggs); another five were also technically lacto-vegetarian but more importantly perhaps were aspiring vegans, with only very occasional (sometimes unintentional) dairy consumption (labelled in this thesis as "usually vegan"); and, finally, one was vegan (excludes all animal products).

It seems contradictory for people to identify themselves as vegetarian and yet consume fish and/or meat. The two respondents in this situation justified eating fish for health reasons. One person used health and her age to justify her behaviour:

Now that I'm getting older, I'm having fish maybe once every two or three months.

Female, aged 50 (semi-vegetarian)

The second person, who ate fish once a week, was having doubts about her consumption of this food, despite the health benefits that she believed fish provide:

I'm mostly swayed because my second choice of influences is health. More and more you read that fish contain something reasonably healthy for us, and if you look at the Mediterranean diet...it's weighed for fish instead of meat. But the animal cruelty side of things and the raping of the ocean! And the pet-food market and whatever else...I might say it's a bit of a dilemma at the moment. I'm thinking of taking a pill for whatever it is!

Female, aged 48 (semi-vegetarian)

This person also ate chicken every three months. It was only eaten in particular social situations:

I avoid it [chicken] like the plague, but I have been known to eat it [about once every three months]...sometimes in situations...I don't make a big song and dance about it.

Female, aged 48 (semi-vegetarian)

Although all interviewees identified themselves as vegetarians or vegans, the vignettes that report the summarised results of the interviews in Chapter 5 label each self-identified vegetarian according to their actual consumption of animal foods (e.g. the two women noted above are labelled as "semi-vegetarian", while those vegetarians who eat dairy and eggs are labelled as "lacto-ovo-vegetarians"). This provides some additional information about each interviewee, thus forming a stronger context for the quotations.

APPENDIX 5

Questionnaire Cover Letter

5 May 1999

Dear Sir/Madam

We now eat very different foods than we did a generation ago. These days there are a lot of different opinions about food, especially about meat and vegetables. The purpose of this survey is to learn about people's food choices, information use and attitudes. There are questions on what your food concerns are, how you find information about food and health, your consumption of different foods, your attitudes towards food, health and vegetarianism, your personal values and your social background. The survey is being conducted jointly by Tony Worsley, Professor of Public and Environmental Health, and Emma Lea, PhD student, from The University of Adelaide.

Your views on these issues are extremely valuable. *You are one of 1000 South Australians who are being asked to give their opinions.* The process of selection was to take names at random from the telephone directory. *We need the opinions of everyone who was selected so that we can get a complete, representative picture of what this society thinks about these issues.* It doesn't matter if you feel you don't know much about this area, or if you're not particularly interested in it, or even if you think you have unusual views - we still want to know what YOU think.

Thank you for your assistance. Your participation is greatly appreciated. Whilst we would like you to answer all the questions, please remember that your participation is voluntary - if there are any questions you do not want to answer that is OK.

Your response will remain confidential. Please be assured that your answers will be treated in the strictest confidence. No personal information will be given to anyone and all the data gained from the survey will be stored separately from any names or addresses or identifying information. The questionnaire has an identification number for mailing purposes only. This is so we can cross your name off the mailing list when your questionnaire is returned. Your name will not be placed on the questionnaire.

Would you like to know the results of the survey? We plan to have a summary of the findings of this survey in about six months time. If you would like a copy, please tick the box at the end of the questionnaire.

We would be most happy to answer any questions you might have. The contact details are as follows.

Phone: (08) 8303 3581 or 8303 3575

Fax: (08) 8223 4075

e-mail: emma.lea@student.adelaide.edu.au

Thank you for your help.

Yours sincerely

EMMA LEA - Survey Coordinator/PhD Student

APPENDIX 6

Questionnaire

Note that the first section of the questionnaire, "Your concerns about the food supply", is not examined in this thesis, as it is part of another study that will be reported elsewhere.

Survey from Appendix 6: *Food choice, information and your attitudes* is not included in electronic copy of this thesis. It is included in paper copies in the Barr Smith Library.

APPENDIX 7

Responses to Questionnaire Items for the Random Population Sample

TABLE 1
Percentages of randomly selected respondents' use of sources of food, health and nutrition information

ITEM	% Use Often <i>or</i> Sometimes
Use food labels	81
Use family	69
Use television programs	62
Use books	61
Use friends	61
Use advertising	60
Use newspaper articles	59
Use articles in cooking magazines	58
Use doctors (medical)	45
Use articles in health magazines	44
Use National Heart Foundation/Anti-Cancer Foundation	43
Use articles in women's magazines	42
Use radio programs	40
Use work-mates	34
Use dietitians/nutritionists	33
Use health food shops/staff	27
Use alternative health practitioners	21
Use teachers/school/higher education	19
Use articles in science magazines	19
Use articles in vegetarian magazines	17
Use articles in sports magazines	14
Use slimming clubs	9
Use the Internet	5

Analyses for this and the following tables were based on the responses of 601 randomly selected respondents.

TABLE 2
Percentages of randomly selected respondents' level of trust ("trust totally" + "trust") in sources of food, health and nutrition information, together with their rankings for use as a comparison

ITEM	% Trust (% <i>Unsure</i>)	<i>Use</i> <i>Ranking</i>
Trust National Heart F'dn/Anti-Cancer F'dn	83 (16)	11
Trust doctors (medical)	82 (15)	9
Trust dietitians/nutritionists	71 (25)	15
Trust family	56 (38)	2
Trust articles in cooking magazines	52 (40)	8
Trust articles in health magazines	52 (41)	10
Trust books	46 (47)	4
Trust food labels	42 (35)	1
Trust friends	40 (51)	5
Trust articles in science magazines	38 (52)	19
Trust alternative health practitioners	37 (51)	17
Trust television programs	34 (42)	3
Trust health food shops/staff	33 (51)	16
Trust newspaper articles	30 (51)	7
Trust articles in vegetarian magazines	30 (60)	20
Trust radio programs	27 (52)	13
Trust articles in women's magazines	27 (50)	12
Trust teachers/school/higher education	25 (64)	18
Trust advertising	19 (40)	6
Trust work-mates	19 (64)	14
Trust articles in sports magazines	18 (62)	21
Trust slimming clubs	14 (52)	22
Trust the Internet	4 (68)	23

TABLE 3
Percentages of randomly selected respondents level of agreement ("strongly agree" + "agree")
with general nutrition beliefs and behaviour

ITEM	% Agree (% <i>Unsure</i>)
Diet is important in preventing illness and disease	93 (4)
I frequently look for information on healthy eating	61 (15)
I do not need to make any changes to the food I eat as it is already healthy enough	44 (19)
I usually do not think about the nutritional aspects of the types of food that I eat	31 (8)

TABLE 4
Percentages of randomly selected respondents level of agreement ("strongly agree" + "agree")
with beliefs about meat

ITEM	% Agree (% <i>Unsure</i>)
I love to eat red meat such as beef, veal or lamb	77 (6)
Meat is necessary in the adult human diet	64 (17)
Meat is necessary in children's diets	63 (25)
Meat is important for building strength	59 (28)
Meat is more a food that men are likely to eat	52 (19)
Red meat is the best-absorbed source of dietary iron	50 (39)
Red meat is very expensive	46 (13)
When I eat out to celebrate a social occasion, I usually eat some kind of red meat	42 (11)
Meat is important for the health of babies and toddlers	40 (39)
Nothing satisfies my appetite like a thick juicy steak	28 (12)
Meat production is cruel to animals	21 (26)
I prefer to eat red meat more than fruit or vegetables	20 (12)
Non-vegetarians are healthier than vegetarians	14 (42)
Red meat such as beef or lamb is fattening	12 (15)
Humans have no right to kill animals for food	10 (14)
Meat causes heart disease	9 (35)
Vegetarians are hippies or weirdos	7 (12)
Meat such as beef and lamb is unhealthy to eat	5 (10)
I think meat is disgusting	4 (6)
Meat causes cancer	4 (36)

TABLE 5
Percentages of randomly selected respondents level of agreement ("strongly agree" + "agree")
with barriers to eating a vegetarian diet

ITEM	% Agree (% <i>Unsure</i>)
I like eating meat	78 (9)
I do not want to change my eating habit or routine	56 (17)
I think humans are meant to eat meat	44 (25)
My family eats meat	43 (9)
I need more information about vegetarian diets	42 (17)
There is too limited a choice when I eat out	35 (21)
My friends eat meat	32 (12)
My family/spouse/partner won't eat vegetarian food	30 (14)
I would be (or am) worried about my health (other than lack of iron or protein)	28 (28)
There is not enough iron in vegetarian diets	28 (36)
It is inconvenient	23 (25)
Vegetarian diets are boring	23 (28)
There is not enough protein in vegetarian diets	22 (36)
I don't know what to eat instead of meat	21 (17)
I don't want to eat strange or unusual foods	21 (14)
I don't have enough willpower	20 (15)
Vegetarian diets are not filling enough	18 (29)
I wouldn't (or don't) get enough energy or strength from the food	16 (33)
I lack the right cooking skills	15 (14)
Vegetarian options are not available where I shop or in the canteen or at my home	14 (20)
Someone else decides on most of the food I eat	10 (7)
I would (or do) feel conspicuous among others	9 (19)
It takes too long to prepare vegetarian food	8 (31)
I don't want people to stereotype me negatively (e.g. that I must be strange)	8 (13)
People would (or do) think that I'm a wimp or not "macho" enough	4 (11)

TABLE 6
Percentages of randomly selected respondents level of agreement ("strongly agree" + "agree")
with benefits of eating a vegetarian diet

ITEM	% Agree (% <i>Unsure</i>)
Eat more fruit and vegetables	74 (10)
Decrease saturated fat intake in my diet	65 (21)
Control my weight	40 (29)
Help animal welfare/rights	36 (31)
Prevent disease in general (e.g. heart disease, cancer)	36 (38)
Be healthier by decreasing my intake of chemicals, steroids and antibiotics which are found in meat	31 (41)
Stay healthy	30 (36)
Eat a greater variety of interesting foods	25 (33)
Increase my control over my own health	23 (38)
Help the environment	22 (35)
Save money	21 (37)
Be fit	21 (32)
Have plenty of energy	20 (46)
Lower my chances of getting food poisoning	19 (33)
Live longer	18 (48)
Have a better quality of life	17 (37)
Increase the efficiency of food production	15 (43)
Decrease hunger in the Third World	14 (39)
Be more content with myself	11 (36)
Have a tastier diet	11 (34)
Be less aggressive	8 (36)
Create a more peaceful world	7 (26)
Satisfy my religious and/or spiritual needs	5 (19)
Help the feminist cause	3 (28)

TABLE 7
Percentages of randomly selected respondents who believe each value item is a "very" important guiding principle in their life

ITEM	% Very Important (% Fairly Important)
Family security (safety for loved ones)	83 (16)
Healthy (not being ill physically or mentally)	76 (22)
Honouring of parents and elders (showing respect)	68 (30)
Enjoying life (enjoying food, sex, leisure etc.)	67 (31)
Equality (equal opportunity for all)	62 (31)
Inner harmony (peace with myself)	61 (34)
Protecting the environment (preserving nature)	52 (43)
Independent (self-reliant, self-sufficient)	49 (45)
Successful (achieving goals)	38 (54)
Helpful (working for the welfare of others)	37 (57)
Self-discipline (self-restraint)	36 (55)
A varied life (filled with challenge, novelty and change)	30 (53)
Social order (stability of society)	30 (47)
A world of beauty (beauty of nature and the arts)	30 (53)
Unity with nature (fitting into nature)	28 (55)
Respect for tradition (preservation of time honoured customs)	27 (49)
An exciting life (stimulating experiences)	24 (55)
Devout (holding to religious faith and belief)	19 (34)
Moderate (avoiding extremes of feeling and action)	19 (59)
Preserving my public image (protecting my "face")	14 (46)
Wealth (material possessions, money)	9 (52)
Authority (the right to lead or command)	6 (26)
Social power (control over others)	2 (11)

TABLE 8
The percentage of randomly selected respondents who stated that they consume red meat, white meat, fish/seafood, eggs, and dairy at various frequencies

FOOD	Never	Rarely	1-3 x month (%)	1-4 x week	Daily
Red meat	2.5	5.4	16.2	65.2	10.7
White meat	1.5	3.4	17.4	72.7	5.0
Fish/seafood	2.6	12.8	40.3	43.0	1.4
Eggs	0.8	12.5	31.6	49.2	5.9
Dairy	0.7	7.2	4.9	21.8	65.4

ITEMS ABOUT VEGETARIANISM AND RECALL OF INFORMATION

Recall of the promotion of meat eating by information sources

No recall of such promotion.....	43.5%
Recall of promotion.....	56.5%
Main three sources (% of total sample):	
Advertising (22.8%)	
Television programs (16.1%)	
Articles in women's magazines (2.7%)	

Recall of the promotion of vegetarianism by information sources

No recall of such promotion.....	69.4%
Recall of promotion.....	30.6%
Main three sources (% of total sample):	
Television programs (6.4%)	
Articles in vegetarian magazines (3.4%)	
Articles in women's magazines (2.6%)	

Interest in vegetarianism

Not interested.....	58.5%
Somewhat interested.....	32.1%
Very interested.....	6.6%
Unsure.....	2.9%

Never talked about vegetarianism.....	32.2%
Talked once or twice about it.....	24.3%
Sometimes talked about it.....	31.8%
Often talked about it.....	10.7%
Talk about it all the time.....	1.0%

Thought about possible changes that could be made towards eating a vegetarian diet in the past month:

No.....	74.3%
Once or twice.....	9.1%
Sometimes.....	10.6%
Quite often.....	4.0%
All the time.....	0.3%
Already vegetarian.....	1.7%

7.7% of respondents had been, or were at the time of responding to the survey, vegetarian

Level of likelihood of making some changes towards becoming vegetarian...

	...in the next month	...during the next 6 months
Not at all likely.....	82.1%	79.7%
Slightly likely.....	10.0%	11.4%
Quite likely.....	2.0%	2.2%
Very likely.....	0.7%	1.0%
Unsure.....	3.2%	3.7%
Already vegetarian.....	2.0%	2.0%

Vegetarian significant others

No vegetarian family members.....	86.9%
One vegetarian family member (usually a sibling or child).....	11.9%
Two vegetarian family members.....	1.0%
Three vegetarian family members.....	0.2%

No vegetarian friends.....	48.7%
A few.....	47.9%
Quarter of friends.....	2.1%
Half of friends.....	0.8%
All.....	0.5%

APPENDIX 8

Principal Components Analysis Results for the Random Population Sample

TABLE 1
Results of principal components analysis of use of food, health and nutrition information sources for the random population sample

FACTOR & ITEMS	Factor loading
Factor 1: Use print media	
Eigenvalue: 5.93	
Cronbach Alpha: 0.78	
Percent of Variance: 25.8%	
Articles in cooking magazines	76
Articles in health magazines	69
Articles in women's magazines	61
Articles in vegetarian magazines	59
Health food shops/staff	44
Books	41
Factor 2: Use advertising and mass media	
Eigenvalue: 2.10	
Cronbach Alpha: 0.76	
Percent of Variance: 9.1%	
Advertising (TV, radio, magazine ads etc.)	81
Television programs	80
Radio programs	67
Newspaper articles	54
Articles in women's magazines	43
Factor 3: Use orthodox sources	
Eigenvalue: 1.62	
Cronbach Alpha: 0.69	
Percent of Variance: 7.0%	
Doctors (medical)	70
Dietitians/Nutritionists	68
National Heart Foundation/Anti-Cancer Foundation	63
Alternative health practitioners	59
Health food shops and staff	52
Factor 4: Use social sources	
Eigenvalue: 1.35	
Cronbach Alpha: 0.77 (0.78 if last item omitted)	
Percent of Variance: 5.9%	
Friends	86
Family	83
Work-mates	66
Teachers/school/higher education	42

[over]

TABLE 1 [continued]

FACTOR & ITEMS	Factor loading
Factor 5: Use specialised media	
Eigenvalue: 1.23	
Cronbach Alpha: 0.59	
Percent of Variance: 5.4%	
Articles in science magazines	64
Articles in sports magazines	63
Internet	56
Teachers/school/higher education	54
Factor 6: Use food labels and books	
Eigenvalue: 1.03	
Cronbach Alpha: 0.54 (0.56 if last item omitted)	
Percent of Variance: 4.5%	
Food labels	71
Books	46
Newspaper articles	39
Articles in sports magazines	-37

Analyses for this and the following tables were based on the responses of 601 randomly selected respondents.

TABLE 2
Results of principal components analysis of trust in food, health and nutrition information sources for the random population sample

FACTOR & ITEMS	Factor loading
Factor 1: Trust advertising and mass media	
Eigenvalue: 7.87	
Cronbach Alpha: 0.84 (0.86 if last item omitted)	
Percent of Variance: 34.2%	
Advertising (TV, radio, magazine ads etc.)	81
Television programs	79
Radio programs	66
Articles in women's magazines	61
Newspaper articles	53
Articles in cooking magazines	44
Food labels	37
Factor 2: Trust social sources	
Eigenvalue: 1.94	
Cronbach Alpha: 0.83	
Percent of Variance: 8.4%	
Friends	86
Family	84
Work-mates	71
Teachers/school/higher education	53
Factor 3: Trust unorthodox sources	
Eigenvalue: 1.75	
Cronbach Alpha: 0.83	
Percent of Variance: 7.6%	
Health food shops and staff	70
Alternative health practitioners	64
Articles in vegetarian magazines	63
Articles in health magazines	56
Slimming clubs	56
Articles in cooking magazines	46
Articles in women's magazines	36
Factor 4: Trust specialised media	
Eigenvalue: 1.26	
Cronbach Alpha: 0.81	
Percent of Variance: 5.5%	
Articles in science magazines	78
Articles in sports magazines	60
Books	51
Articles in health magazines	50
Articles in vegetarian magazines	45
Internet	41
Radio programs	40
Newspaper articles	36

[over]

TABLE 2 [continued]

FACTOR & ITEMS	Factor loading
Factor 5: Trust orthodox sources	
Eigenvalue: 1.12	
Cronbach Alpha: 0.75	
Percent of Variance: 4.9%	
National Heart Foundation/Anti-Cancer Foundation	82
Doctors (medical)	77
Dietitians/Nutritionists	68
Factor 6: Trust food labels and internet	
Eigenvalue: 1.05	
Cronbach Alpha: 0.63	
Percent of Variance: 4.6%	
Food labels	61
Internet	55
Slimming clubs	42
Teachers/school/higher education	41

TABLE 3
Results of principal components analysis of beliefs about meat for the random population sample

FACTOR & ITEMS	Factor loading
Factor 1: Red meat appreciation	
Eigenvalue: 4.93	
Cronbach Alpha: 0.62 (0.78 if last item omitted)	
Percent of Variance: 24.6%	
Nothing satisfies my appetite like a thick juicy steak	77
I prefer to eat red meat more than fruit or vegetables	76
When I eat out to celebrate a social occasion, I usually eat some kind of red meat	70
I love to eat red meat such as beef, veal or lamb	69
Vegetarians are hippies or weirdos	47
Meat is important for building strength	40
I think meat is disgusting	-36
Factor 2: Meat is a necessary dietary component	
Eigenvalue: 2.56	
Cronbach Alpha: 0.78 (0.80 if last item omitted)	
Percent of Variance: 12.7%	
Meat is necessary in children's diets	87
Meat is important for the health of babies and toddlers	84
Meat is necessary in the adult human diet	71
Meat is important for building strength	56
Red meat is the best-absorbed source of dietary iron	47
Factor 3: Meat is not healthy	
Eigenvalue: 1.74	
Cronbach Alpha: 0.77	
Percent of Variance: 8.7%	
Meat causes heart disease	87
Meat causes cancer	85
Red meat such as beef or lamb is fattening	59
Meat such as beef and lamb is unhealthy to eat	53
I think meat is disgusting	35
Factor 4: Cost and animal welfare concerns about meat	
Eigenvalue: 1.13	
Cronbach Alpha: 0.63 (0.64 if 4 th item omitted)	
Percent of Variance: 5.6%	
Red meat is very expensive	62
Meat production is cruel to animals	55
Humans have no right to kill animals for food	54
Meat is more a food that men are likely to eat	49
I think meat is disgusting	41
Meat such as beef and lamb is unhealthy to eat	39

TABLE 4
Results of principal components analysis of barriers to vegetarianism for the random population sample

FACTOR & ITEMS	Factor loading
Factor 1: Lack of knowledge and convenience re vegetarianism	
Eigenvalue: 7.44	
Cronbach Alpha: 0.82	
Percent of Variance: 29.8%	
I don't know what to eat instead of meat	74
I lack the right cooking skills	67
I need more information about vegetarian diets	63
There is too limited a choice when I eat out	59
I don't have enough willpower	58
It is inconvenient	57
It takes too long to prepare vegetarian food	47
Vegetarian options are not available where I shop or in the canteen or at my home	41
Factor 2: Social concerns about vegetarianism	
Eigenvalue: 2.00	
Cronbach Alpha: 0.79	
Percent of Variance: 8.0%	
I don't want people to stereotype me negatively (e.g. that I must be strange)	72
People would (or do) think that I'm a wimp or not "macho" enough	71
I don't want to eat strange or unusual foods	56
I would (or do) feel conspicuous among others	56
Vegetarian options are not available where I shop or in the canteen or at my home	55
Someone else decides on most of the food I eat	54
It takes too long to prepare vegetarian food	38
Factor 3: Health concerns about vegetarianism	
Eigenvalue: 1.76	
Cronbach Alpha: 0.80	
Percent of Variance: 7.0%	
There is not enough protein in vegetarian diets	83
There is not enough iron in vegetarian diets	83
I would be (or am) worried about my health (other than iron or protein)	63
I wouldn't (or don't) get enough energy or strength from the food	38
Factor 4: Food inadequacies of the vegetarian diet	
Eigenvalue: 1.29	
Cronbach Alpha: 0.77 (0.80 if last item omitted)	
Percent of Variance: 5.2%	
Vegetarian diets are boring	72
Vegetarian diets are not filling enough	72
I wouldn't (or don't) get enough energy or strength from the food	61
I think humans are meant to eat meat	40

[over]

TABLE 4 [continued]

FACTOR & ITEMS	Factor loading
Factor 5: Social influences against vegetarianism	
Eigenvalue: 1.13	
Cronbach Alpha: 0.76 (0.80 if 3 rd item omitted)	
Percent of Variance: 4.5%	
My family eats meat	91
My friends eat meat	87
My family/spouse/partner won't eat vegetarian food	41
I would (or do) feel conspicuous among others	39
Factor 6: Against dietary change and appreciates meat	
Eigenvalue: 1.06	
Cronbach Alpha: 0.20 (0.57 if last item omitted)	
Percent of Variance: 4.2%	
I do not want to change my eating habit or routine	82
I like eating meat	72
I need more information about vegetarian diets	-37

TABLE 5
Results of principal components analysis of benefits of vegetarianism for the random population sample

FACTOR & ITEMS	Factor loading
Factor 1: Health benefits of vegetarianism	
Eigenvalue: 10.89	
Cronbach Alpha: 0.93 (0.94 if 11 th item omitted)	
Percent of Variance: 45.4%	
Prevent disease in general (e.g. heart disease, cancer)	75
Stay healthy	74
Control my weight	70
Live longer	68
Decrease saturated fat intake in my diet	67
Have a better quality of life	66
Increase my control over my own health	65
Have plenty of energy	64
Be fit	61
Eat a greater variety of interesting foods	55
Eat more fruit and vegetables	52
Have a tastier diet	49
Be healthier by decreasing my intake of chemicals, steroids and antibiotics which are found in meat	47
Be more content with myself	46
Be less aggressive	37
Factor 2: Spiritual, peace and contentment benefits of vegetarianism	
Eigenvalue: 1.96	
Cronbach Alpha: 0.93	
Percent of Variance: 8.2%	
Satisfy my religious and/or spiritual needs	71
Create a more peaceful world	71
Help the feminist cause	70
Be less aggressive	68
Be more content with myself	68
Have a tastier diet	64
Have a better quality of life	53
Be fit	49
Save money	48
Eat a greater variety of interesting foods	44
Have plenty of energy	42
Increase my control over my own health	38
Stay healthy	38
Lower my chances of getting food poisoning	37
Increase the efficiency of food production	37

[over]

TABLE 5 [continued]

FACTOR & ITEMS	Factor loading
Factor 3: Hunger, animal welfare and environmental benefits of vegetarianism	
Eigenvalue: 1.48	
Cronbach Alpha: 0.87	
Percent of Variance: 6.2%	
Decrease hunger in the Third World	76
Help animal welfare/rights	75
Help the environment	75
Increase the efficiency of food production	74
Be healthier by decreasing my intake of chemicals, steroids and antibiotics which are found in meat	49
Lower my chances of getting food poisoning	46
Create a more peaceful world	42

TABLE 6
Results of principal components analysis of personal values for the random population sample

FACTOR & ITEMS	Factor loading
Factor 1: Universal	
Eigenvalue: 5.66	
Cronbach Alpha: 0.79	
Percent of Variance: 24.6%	
A world of beauty (beauty of nature and the arts)	72
Unity with nature (fitting into nature)	72
A varied life (filled with challenge, novelty and change)	63
Protecting the environment (preserving nature)	61
Equality (equal opportunity for all)	53
Inner harmony (peace with myself)	45
Helpful (working for the welfare of others)	42
An exciting life (stimulating experiences)	41
Factor 2: Enjoying a healthy, secure family life	
Eigenvalue: 2.06	
Cronbach Alpha: 0.72	
Percent of Variance: 9.0%	
Enjoying life (enjoying food, sex, leisure etc.)	75
Healthy (not being ill physically or mentally)	65
Family security (safety for loved ones)	50
Honouring of parents and elders (showing respect)	43
Successful (achieving goals)	37
An exciting life (stimulating experiences)	37
Factor 3: Power	
Eigenvalue: 1.66	
Cronbach Alpha: 0.60	
Percent of Variance: 7.2%	
Authority (the right to lead or command)	68
Wealth (material possessions, money)	67
Social power (control over others)	65
Preserving my public image (protecting my "face")	59
Factor 4: Tradition	
Eigenvalue: 1.30	
Cronbach Alpha: 0.67	
Percent of Variance: 5.7%	
Devout (holding to religious faith and belief)	73
Respect for tradition (preservation of time-honoured customs)	59
Honouring of parents and elders (showing respect)	58
Helpful (working for the welfare of others)	42
[over]	

TABLE 6 [continued]

FACTOR & ITEMS	Factor loading
Factor 5: Moderate and independent	
Eigenvalue: 1.16	
Cronbach Alpha: 0.65	
Percent of Variance: 5.0%	
Moderate (avoiding extremes of feeling and action)	74
Independent (self-reliant, self-sufficient)	56
Successful (achieving goals)	54
Helpful (working for the welfare of others)	47
Factor 6: Security and conformity	
Eigenvalue: 1.01	
Cronbach Alpha: 0.60	
Percent of Variance: 4.4%	
Social order (stability of society)	70
Self-discipline (self-restraint)	53
Inner harmony (peace with myself)	45
Family security (safety for loved ones)	42

APPENDIX 9

Multiple Regression Results for the Random Population Sample

MEAT CONSUMPTION

TABLE 1
Multiple regression analysis of frequency of meat consumption for the random population sample

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
ALL RANDOMLY SELECTED RESPONDENTS				
Red meat appreciation	0.40	0.05	***	12.3%
Cost and animal welfare concerns about meat	-0.32	0.05	***	18.9%
Meat is a necessary dietary component	0.28	0.05	***	24.3%
Meat is not healthy	-0.27	0.05	***	28.8%
Lack of knowledge and convenience re vegetarianism	0.18	0.05	***	31.1%
Number of children <18 years living at home	0.12	0.04	**	32.4%
<i>Constant</i>	7.43	0.05	***	
Final R square				32.4%

Note that the factors used as independent variables for this and the following tables were obtained from principal components analyses conducted on the randomly selected sample only, as found in Appendix 8, and therefore differ slightly to those obtained from the pooled random and non-random samples.

Analyses for this and the following tables were based on the responses of 601 randomly selected respondents.

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$ for this and the following tables

TABLE 2
Multiple regression analysis of frequency of meat consumption for the random population sample, with information sources as predictors

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
ALL RANDOMLY SELECTED RESPONDENTS				
Trust advertising and mass media	0.22	0.06	***	2.8%
Trust orthodox sources	0.14	0.06	**	4.4%
Use print media	-0.13	0.06	*	5.4%
<i>Constant</i>	7.52	0.05	***	
Final R square				5.4%

MEAT IS NECESSARY

TABLE 3
Multiple regression analysis of the *Meat is Necessary* score for the random population sample

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
ALL RANDOMLY SELECTED RESPONDENTS				
Health concerns about vegetarianism	0.68	0.13	***	7.8%
Food inadequacies of the vegetarian diet	0.66	0.13	***	14.8%
Against dietary change and appreciates meat	0.56	0.13	***	19.2%
Number of vegetarian family members	-1.19	0.33	***	22.1%
Trust advertising and mass media	0.46	0.13	***	24.5%
Trust social sources	0.36	0.13	**	25.8%
Trust orthodox sources	0.31	0.13	*	26.9%
<i>Constant</i>	<i>14.13</i>	<i>0.12</i>	***	
Final R square				26.9%

TABLE 4
Multiple regression analysis of the *Meat is Necessary* score for the random population sample, with information sources as predictors

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
ALL RANDOMLY SELECTED RESPONDENTS				
Trust advertising and mass media	0.63	0.13	***	4.6%
Trust orthodox sources	0.51	0.13	**	7.5%
Trust social sources	0.42	0.13	**	9.5%
Trust unorthodox sources	-0.30	0.13	*	10.5%
<i>Constant</i>	<i>13.91</i>	<i>0.13</i>	***	
Final R square				10.5%

HEALTH CONCERNS ABOUT VEGETARIANISM

TABLE 5

Multiple regression analysis of *Health Concerns about Vegetarianism* for the random population sample

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
ALL RANDOMLY SELECTED RESPONDENTS				
Meat is a necessary dietary component	0.31	0.05	***	6.8%
Red meat appreciation	0.26	0.05	***	9.4%
Food inadequacies of the vegetarian diet	-0.15	0.05	***	10.9%
Against dietary change and appreciates meat	-0.14	0.05	**	12.7%
<i>Constant</i>	-0.02	0.04	NS	
Final R square				12.7%

TABLE 6

Multiple regression analysis of *Health Concerns about Vegetarianism* for the random population sample, with information sources as predictors

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
ALL RANDOMLY SELECTED RESPONDENTS				
Use social sources	0.13	0.05	**	1.7%
Trust unorthodox sources	-0.13	0.05	**	3.2%
Use specialised media	-0.11	0.05	*	4.4%
Trust orthodox sources	0.10	0.05	*	5.5%
<i>Constant</i>	-0.03	0.04	NS	
Final R square				5.5%

MEAT IS UNHEALTHY

TABLE 7
Multiple regression analysis of the *Meat is Unhealthy* score for the random population sample

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
ALL RANDOMLY SELECTED RESPONDENTS				
Cost and animal welfare concerns about meat	0.34	0.12	**	7.7%
Health benefits of vegetarianism	0.64	0.11	***	13.0%
Spiritual, peace and contentment benefits of vegetarianism	0.59	0.12	***	17.5%
Hunger, animal welfare and environmental benefits of vegetarianism	0.60	0.11	***	21.8%
Male	0.90	0.22	***	24.5%
Social concerns about vegetarianism	0.40	0.12	***	25.8%
"Diet is important in preventing illness and disease"	0.47	0.15	**	27.4%
<i>Constant</i>	5.40	0.78	***	
Final R square				27.4%

TABLE 8
Multiple regression analysis of the *Meat is Unhealthy* score for the random population sample, with information sources as predictors

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
ALL RANDOMLY SELECTED RESPONDENTS				
Trust unorthodox sources	0.44	0.12	***	2.9%
Trust advertising and mass media	-0.30	0.12	**	4.2%
Trust orthodox sources	-0.28	0.12	*	5.3%
<i>Constant</i>	8.75	0.12	***	
Final R square				5.3%

HEALTH BENEFITS OF VEGETARIANISM

TABLE 9

Multiple regression analysis of *Health Benefits of Vegetarianism* for the random population sample

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
ALL RANDOMLY SELECTED RESPONDENTS				
Against dietary change and appreciates meat	-0.22	0.05	***	8.1%
Lack of knowledge and convenience re vegetarianism	0.13	0.05	**	11.7%
Meat is not healthy	0.20	0.05	***	13.8%
"I frequently look for information on healthy eating"	0.15	0.04	***	15.8%
"I do not need to make any changes to the food I eat as it is already healthy enough"	-0.13	0.04	**	18.1%
Trust orthodox sources	0.14	0.05	**	19.4%
Meat is a necessary dietary component	-0.15	0.05	**	20.7%
Hunger, animal welfare and environmental benefits of vegetarianism	-0.14	0.05	**	22.4%
<i>Constant</i>	-0.13	0.19	NS	
Final R square				22.4%

TABLE 10

Multiple regression analysis of *Health Benefits of Vegetarianism* for the random population sample, with information sources as predictors

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
ALL RANDOMLY SELECTED RESPONDENTS				
Use orthodox sources	0.13	0.05	**	2.3%
Trust unorthodox sources	0.12	0.05	**	3.9%
<i>Constant</i>	-0.01	0.05	NS	
Final R square				3.9%

APPENDIX 10

Cross-tabulation Results by Sex and Dietary Group for the Pooled (Random and Vegetarian) Samples

TABLE 1
Results of cross-tabulations analysis of use of food, health and nutrition information sources by sex and dietary group

ITEM	Female			<i>p</i>	Male			<i>p</i>
	Non-veg.	Semi-veg.	Veg.		Non-veg.	Semi-veg.	Veg.	
	% Use Sometimes or Often							
Use advertising	67	39	29	***	53	57	27	**
Use television programs	65	56	37	***	58	60	35	*
Use radio programs	40	42	29	NS	37	55	34	NS
Use articles in women's magazines	57	47	35	**	22	30	10	NS
Use articles in science magazines	17	33	40	***	17	32	29	***
Use articles in sports magazines	10	12	13	NS	18	33	8	*
Use articles in health magazines	49	64	78	***	35	55	55	**
Use articles in cooking magazines	68	61	50	*	46	60	35	NS
Use articles in vegetarian magazines	16	61	82	***	10	45	73	***
Use newspaper articles	61	56	60	NS	57	63	35	*
Use food labels	87	85	89	NS	73	81	77	NS
Use books	70	88	89	**	47	62	81	***
Use dietitians/nutritionists	36	34	31	NS	28	42	25	NS
Use the Internet	6	16	31	***	4	5	29	***
Use doctors (medical)	53	24	29	***	39	30	17	**
Use alternative health practitioners	25	46	51	***	14	40	35	***
Use National Heart Foundation/Anti-Cancer Foundation	41	39	33	NS	45	60	8	***
Use friends	65	73	64	NS	54	68	65	NS
Use family	69	64	37	***	69	78	44	**
Use teachers/school/higher education	19	30	26	NS	17	26	19	NS
Use work-mates	40	56	28	*	26	21	19	NS
Use slimming clubs	13	9	4	NS	5	11	0	NS
Use health food shops/staff	35	49	46	NS	14	32	44	***

For this and the following tables, analyses were based on the following (maximum possible) group sizes: Female - non-vegetarian $n = 306$, semi-vegetarian $n = 34$, vegetarian $n = 55$; Male - non-vegetarian $n = 234$, semi-vegetarian $n = 21$, vegetarian $n = 48$ (respondents identified their own dietary status).

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$ for this and the following tables

TABLE 2
Results of cross-tabulations analysis of trust in food, health and nutrition information sources by sex and dietary group

ITEM	Female				Male			
	Non-veg.	Semi-veg.	Veg.	<i>p</i> % Trust (% <i>Unsure</i>)	Non-veg.	Semi-veg.	Veg.	<i>p</i>
Trust advertising	23 (42)	15 (15)	6 (15)	***	15 (40)	15 (25)	2 (8)	***
Trust television programs	36 (43)	29 (38)	13 (42)	***	32 (41)	25 (35)	10 (21)	***
Trust radio programs	27 (56)	16 (66)	15 (51)	*	29 (47)	42 (37)	17 (50)	NS
Trust articles in women's magazines	34 (49)	27 (46)	17 (33)	***	18 (52)	33 (44)	6 (32)	***
Trust articles in science magazines	36 (55)	36 (55)	42 (49)	NS	38 (50)	59 (29)	38 (38)	NS
Trust articles in sports magazines	16 (67)	16 (58)	9 (56)	*	20 (59)	24 (29)	15 (37)	***
Trust articles in health magazines	53 (39)	66 (28)	55 (36)	NS	47 (46)	72 (22)	71 (21)	**
Trust articles in cooking magazines	54 (40)	63 (31)	28 (50)	***	49 (43)	67 (28)	34 (45)	*
Trust articles in vegetarian magazines	26 (63)	64 (36)	80 (18)	***	26 (60)	61 (39)	83 (13)	***
Trust newspaper articles	34 (52)	27 (59)	16 (58)	NS	27 (52)	33 (39)	13 (25)	***
Trust food labels	47 (37)	39 (24)	35 (47)	*	37 (33)	39 (33)	33 (38)	NS
Trust books	49 (44)	52 (46)	62 (36)	NS	42 (52)	53 (32)	54 (44)	NS
Trust dietitians/nutritionists	74 (24)	67 (24)	55 (36)	**	68 (28)	79 (21)	43 (47)	**
Trust the Internet	3 (74)	10 (69)	17 (63)	**	5 (62)	0 (60)	7 (73)	NS
Trust doctors (medical)	83 (14)	73 (15)	35 (31)	***	82 (15)	67 (28)	34 (21)	***
Trust alternative health practitioners	40 (51)	55 (42)	47 (49)	NS	33 (50)	53 (37)	51 (38)	NS
Trust National Heart Foundation/Anti-Cancer Foundation	86 (14)	73 (24)	56 (26)	***	80 (18)	95 (5)	42 (38)	***
Trust friends	43 (49)	53 (44)	32 (57)	NS	37 (53)	42 (47)	48 (44)	NS
Trust family	55 (39)	55 (39)	29 (58)	**	57 (36)	75 (20)	35 (44)	**
Trust teachers/school/higher education	29 (63)	23 (68)	24 (54)	*	20 (67)	33 (56)	22 (54)	NS
Trust work-mates	22 (66)	38 (53)	19 (56)	*	14 (65)	18 (53)	6 (49)	*
Trust slimming clubs	18 (56)	7 (48)	4 (38)	***	9 (49)	18 (35)	4 (15)	***
Trust health food shops/staff	39 (52)	46 (49)	42 (53)	NS	24 (51)	42 (42)	60 (28)	***

TABLE 3
Results of cross-tabulations analysis of general nutrition beliefs and behaviours by sex and dietary group

ITEM	Female		Veg.	<i>p</i> % Agree	Male		Veg.	<i>p</i>
	Non-veg.	Semi-veg			Non-veg.	Semi-veg		
Diet is important in preventing illness and disease	97 (3)	91 (3)	98 (0)	NS	88 (6)	100 (0)	100 (0)	NS
I do not need to make any changes to the food I eat as it is already healthy enough	46 (16)	47 (15)	49 (18)	NS	41 (21)	32 (21)	69 (13)	**
I usually do not think about the nutritional aspects of the types of food that I eat	28 (7)	12 (0)	7 (6)	***	36 (10)	21 (5)	9 (6)	***
I frequently look for information on healthy eating	72 (12)	79 (9)	87 (4)	NS	45 (19)	65 (19)	74 (11)	**

TABLE 4
Results of cross-tabulations analysis of beliefs about meat by sex and dietary group

ITEM	Female				Male			
	Non-veg.	Semi-veg	Veg.	<i>p</i> % Agree (% Unsure)	Non-veg.	Semi-veg	Veg.	<i>p</i>
I love to eat red meat such as beef, veal or lamb	78 (7)	12 (9)	0 (0)	***	87 (5)	35 (25)	0 (2)	***
I prefer to eat red meat more than fruit or vegetables	14 (12)	0 (3)	0 (0)	***	32 (15)	0 (5)	0 (2)	***
I think meat is disgusting	3 (6)	18 (15)	70 (11)	***	2 (4)	32 (5)	71 (13)	***
Nothing satisfies my appetite like a thick juicy steak	20 (12)	0 (0)	0 (0)	***	42 (14)	22 (0)	0 (0)	***
Meat such as beef and lamb is unhealthy to eat	2 (8)	12 (24)	56 (13)	***	4 (9)	33 (28)	73 (13)	***
Red meat such as beef or lamb is fattening	10 (11)	9 (31)	37 (32)	***	12 (19)	39 (22)	55 (23)	***
Meat is necessary in the adult human diet	65 (17)	18 (27)	0 (0)	***	72 (15)	21 (32)	2 (6)	***
Meat is important for the health of babies and toddlers	45 (35)	30 (33)	2 (9)	***	38 (45)	5 (47)	2 (15)	***
Meat is necessary in children's diets	68 (23)	33 (30)	0 (9)	***	65 (29)	32 (32)	0 (13)	***
Meat causes cancer	1 (32)	18 (42)	42 (35)	***	4 (39)	21 (58)	50 (40)	***
Meat causes heart disease	6 (32)	24 (33)	46 (32)	***	8 (40)	33 (50)	65 (23)	***
Red meat is the best-absorbed source of dietary iron	52 (36)	24 (46)	27 (20)	***	51 (43)	32 (26)	4 (32)	***
Non-vegetarians are healthier than vegetarians	12 (44)	9 (18)	2 (2)	***	17 (45)	15 (15)	2 (6)	***
Red meat is very expensive	47 (10)	52 (15)	31 (55)	***	47 (14)	58 (16)	29 (60)	***
When I eat out to celebrate a social occasion, I usually eat some kind of red meat	37 (11)	6 (6)	0 (0)	***	53 (12)	21 (16)	0 (0)	***
Meat is important for building strength	57 (31)	18 (39)	7 (2)	***	69 (24)	21 (32)	2 (13)	***
Meat is more a food that men are likely to eat	53 (15)	42 (18)	35 (27)	NS	49 (24)	58 (21)	35 (21)	NS
Meat production is cruel to animals	20 (29)	67 (12)	95 (2)	***	15 (23)	61 (22)	92 (6)	***
Humans have no right to kill animals for food	8 (17)	32 (15)	73 (15)	***	7 (9)	53 (5)	65 (17)	***
Vegetarians are hippies or weirdos	5 (11)	0 (0)	4 (0)	**	11 (16)	5 (0)	11 (9)	NS

TABLE 5
Results of cross-tabulations analysis of barriers to vegetarianism by sex and dietary group

ITEM	Female				Male			
	Non-veg.	Semi-veg	Veg.	<i>p</i> % Agree (% Unsure)	Non-veg.	Semi-veg	Veg.	<i>p</i>
My friends eat meat	30 (10)	31 (0)	26 (4)	NS	32 (17)	20 (10)	10 (2)	***
My family eats meat	44 (8)	42 (0)	27 (4)	*	42 (12)	30 (5)	11 (4)	***
I like eating meat	81 (10)	36 (15)	0 (4)	***	85 (7)	35 (10)	2 (2)	***
I would (or do) feel conspicuous among others	10 (16)	7 (3)	9 (7)	NS	8 (24)	10 (15)	6 (6)	NS
There is not enough iron in vegetarian diets	30 (33)	19 (13)	6 (7)	***	28 (45)	14 (19)	2 (6)	***
There is not enough protein in vegetarian diets	24 (32)	9 (13)	0 (4)	***	22 (45)	5 (19)	2 (4)	***
I would be (or am) worried about my health (other than lack of iron or protein)	33 (26)	13 (13)	6 (4)	***	27 (33)	15 (15)	0 (6)	***
Someone else decides on most of the food I eat	5 (7)	6 (0)	0 (2)	NS	16 (9)	5 (10)	2 (2)	*
My family/spouse/partner won't eat vegetarian food	41 (10)	17 (7)	6 (0)	***	19 (20)	5 (14)	4 (10)	**
It takes too long to prepare vegetarian food	9 (29)	6 (6)	2 (0)	***	6 (40)	19 (5)	0 (0)	***
I don't want to eat strange or unusual foods	21 (13)	9 (3)	0 (4)	***	22 (16)	10 (10)	0 (2)	***
Vegetarian options are not available where I shop or in the canteen or at my home	11 (18)	16 (3)	15 (6)	*	17 (25)	20 (0)	8 (8)	**
I don't have enough willpower	24 (16)	13 (3)	2 (0)	***	17 (16)	15 (0)	2 (2)	***
I think humans are meant to eat meat	42 (27)	13 (19)	0 (0)	***	53 (21)	10 (35)	0 (6)	***
It is inconvenient	25 (20)	16 (9)	4 (2)	***	21 (33)	24 (14)	6 (4)	***
I don't know what to eat instead of meat	25 (15)	6 (3)	4 (2)	***	19 (21)	14 (14)	4 (0)	***
I lack the right cooking skills	16 (13)	0 (3)	0 (0)	***	15 (17)	15 (10)	2 (0)	***
I do not want to change my eating habit or routine	60 (16)	25 (16)	2 (2)	***	57 (17)	20 (15)	6 (4)	***
There is too limited a choice when I eat out	35 (17)	38 (3)	37 (6)	NS	36 (28)	35 (20)	25 (6)	***
People would (or do) think that I'm a wimp or not "macho" enough	3 (10)	3 (3)	6 (4)	NS	4 (13)	5 (10)	4 (6)	NS
Vegetarian diets are not filling enough	16 (26)	9 (0)	2 (2)	***	21 (38)	15 (0)	4 (0)	***
Vegetarian diets are boring	22 (28)	6 (0)	2 (2)	***	27 (35)	15 (0)	0 (0)	***
I don't want people to stereotype me negatively (e.g. that I must be strange)	8 (11)	9 (0)	6 (2)	NS	6 (19)	5 (0)	4 (6)	NS
I wouldn't (or don't) get enough energy or strength from the food	17 (30)	9 (16)	4 (4)	***	17 (39)	5 (20)	0 (2)	***
I need more information about vegetarian diets	44 (15)	28 (6)	9 (7)	***	39 (19)	45 (15)	19 (10)	**

TABLE 6
Results of cross-tabulations analysis of benefits of vegetarianism by sex and dietary group

ITEM	Female				Male			
	Non-veg.	Semi-veg	Veg.	<i>p</i> % Agree (% Unsure)	Non-veg.	Semi-veg	Veg.	<i>p</i>
Control my weight	38 (28)	41 (19)	55 (22)	NS	38 (34)	71 (24)	58 (25)	**
Prevent disease in general (e.g. heart disease, cancer)	32 (38)	79 (15)	91 (7)	***	29 (43)	95 (5)	88 (12)	***
Decrease saturated fat intake in my diet	61 (22)	74 (15)	86 (13)	**	67 (23)	95 (0)	94 (4)	NS
Live longer	14 (51)	39 (52)	69 (27)	***	16 (46)	57 (38)	77 (23)	***
Eat a greater variety of interesting foods	24 (33)	70 (12)	87 (7)	***	20 (33)	52 (43)	90 (8)	***
Have plenty of energy	19 (47)	52 (30)	80 (18)	***	13 (48)	52 (43)	79 (21)	***
Have a better quality of life	14 (38)	55 (24)	89 (11)	***	10 (39)	57 (38)	88 (10)	***
Stay healthy	28 (37)	70 (12)	98 (2)	***	22 (39)	76 (24)	90 (10)	***
Be less aggressive	8 (37)	24 (42)	31 (42)	***	2 (35)	33 (43)	52 (31)	***
Be more content with myself	9 (37)	36 (36)	76 (18)	***	6 (36)	52 (29)	94 (4)	***
Save money	21 (33)	49 (24)	51 (22)	***	17 (43)	50 (35)	52 (27)	***
Have a tastier diet	8 (37)	52 (18)	93 (6)	***	6 (32)	50 (35)	88 (10)	***
Satisfy my religious and/or spiritual needs	5 (21)	28 (19)	65 (11)	***	1 (16)	32 (11)	73 (10)	***
Be fit	18 (36)	50 (31)	75 (20)	***	16 (29)	76 (19)	69 (23)	***
Eat more fruit and vegetables	75 (11)	79 (9)	96 (2)	*	72 (11)	95 (5)	92 (2)	**
Be healthier by decreasing my intake of chemicals, steroids and antibiotics which are found in meat	31 (46)	79 (12)	95 (5)	***	22 (41)	76 (24)	92 (6)	***
Increase my control over my own health	20 (39)	55 (36)	93 (6)	***	18 (39)	65 (30)	85 (10)	***
Lower my chances of getting food poisoning	18 (37)	55 (18)	69 (22)	***	13 (30)	67 (24)	83 (10)	***
Help the environment	19 (41)	58 (21)	98 (2)	***	17 (30)	76 (19)	96 (4)	***
Decrease hunger in the Third World	11 (44)	27 (49)	75 (20)	***	11 (34)	52 (24)	83 (9)	***
Help animal welfare/rights	36 (36)	73 (12)	100 (0)	***	28 (27)	67 (24)	98 (2)	***
Increase the efficiency of food production	11 (48)	49 (36)	84 (16)	***	13 (38)	50 (35)	88 (8)	***
Help the feminist cause	4 (29)	3 (48)	24 (46)	***	2 (25)	11 (42)	17 (71)	***
Create a more peaceful world	6 (29)	19 (53)	82 (11)	***	5 (18)	35 (40)	82 (17)	***

TABLE 7
Results of cross-tabulations analysis of personal values by sex and dietary group

ITEM	Female			<i>p</i>	Male			<i>p</i>
	Non-veg.	Semi-veg	Veg.		Non-veg.	Semi-veg	Veg.	
			% Very important		(% Fairly important)			
Equality (equal opportunity)	63 (31)	79 (18)	87 (13)	**	57 (34)	80 (20)	88 (13)	***
Inner harmony (peace with myself)	68 (28)	79 (18)	80 (16)	NS	47 (46)	75 (25)	77 (21)	***
Social power (control over others)	2 (12)	0 (10)	0 (15)	NS	0 (10)	10 (5)	0 (4)	***
Social order (stability of society)	31 (45)	29 (47)	26 (53)	NS	29 (49)	65 (30)	21 (48)	**
An exciting life (stimulating experiences)	23 (56)	42 (33)	52 (42)	***	21 (58)	45 (45)	40 (45)	**
Wealth (material possessions, money)	8 (51)	6 (39)	7 (24)	**	10 (54)	10 (45)	4 (31)	**
Self-discipline (self-restraint)	37 (57)	38 (50)	26 (51)	**	34 (55)	48 (43)	42 (40)	NS
Family security (safety for loved ones)	87 (12)	79 (18)	80 (20)	NS	77 (20)	76 (19)	69 (25)	NS
Unity with nature (fitting into nature)	28 (57)	56 (35)	78 (22)	***	21 (57)	52 (43)	63 (33)	***
Authority (the right to lead or command)	4 (23)	0 (21)	2 (18)	NS	7 (29)	15 (30)	2 (15)	NS
A varied life (filled with challenge, novelty and change)	33 (48)	49 (36)	69 (27)	***	23 (61)	43 (57)	54 (42)	***
A world of beauty (beauty of nature and the arts)	31 (53)	70 (21)	80 (18)	***	22 (57)	67 (29)	60 (35)	***
Protecting the environment (preserving nature)	53 (43)	77 (18)	93 (7)	***	45 (47)	71 (29)	81 (19)	***
Honouring of parents and elders (showing respect)	72 (26)	63 (34)	36 (55)	***	63 (34)	76 (19)	27 (50)	***
Enjoying life (enjoying food, sex, leisure etc.)	67 (31)	79 (18)	61 (37)	NS	66 (32)	62 (38)	58 (35)	NS
Devout (holding to religious faith and belief)	22 (36)	9 (49)	9 (29)	*	18 (31)	20 (25)	21 (19)	NS
Healthy (not being ill physically or mentally)	79 (20)	85 (15)	80 (20)	NS	69 (28)	100 (0)	69 (31)	*
Respect for tradition (preservation of time-honoured customs)	29 (46)	21 (61)	15 (36)	***	25 (48)	24 (67)	13 (17)	***
Preserving my public image (protecting my "face")	16 (42)	12 (42)	2 (16)	***	12 (50)	14 (43)	2 (21)	***
Independent (self-reliant, self-sufficient)	51 (43)	74 (27)	69 (29)	**	42 (49)	52 (48)	67 (23)	**
Helpful (working for the welfare of others)	45 (51)	41 (50)	52 (46)	NS	24 (66)	60 (40)	35 (58)	**
Moderate (avoiding extremes of feeling and action)	20 (59)	21 (47)	15 (33)	***	13 (63)	45 (40)	15 (40)	***
Successful (achieving goals)	40 (53)	46 (46)	48 (48)	NS	34 (58)	52 (43)	44 (44)	NS

APPENDIX II

Multiple Regression Results by Sex and Age Group for the Pooled (Random and Vegetarian) Samples

TABLE 1
Multiple regression analysis of frequency of meat consumption, with information sources as
predictors, for sex and age groups

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
WOMEN				
Use unorthodox sources	-0.45	0.13	***	23.3%
Trust orthodox sources	0.88	0.11	***	33.4%
Trust advertising and mass media	0.62	0.10	***	39.0%
Trust specialised media	-0.53	0.10	***	43.6%
Trust unorthodox sources	-0.39	0.12	***	45.6%
<i>Constant</i>	<i>6.83</i>	<i>0.09</i>	***	
Final R square				45.6%
MEN				
Use unorthodox sources	-0.91	0.14	***	37.6%
Trust advertising and mass media	0.42	0.13	**	43.3%
Trust orthodox sources	0.43	0.12	***	50.5%
Trust unorthodox sources	-0.23	0.11	*	52.2%
Use orthodox sources	0.32	0.12	**	53.3%
Use mass media	0.36	0.12	**	54.2%
Use specialised media a	0.34	0.12	**	55.8%
<i>Constant</i>	<i>6.64</i>	<i>0.10</i>	***	
Final R square				55.8%
YOUNG PEOPLE				
Use unorthodox sources	-1.15	0.13	***	41.7%
Trust advertising and mass media	0.62	0.13	***	48.1%
Trust orthodox sources	0.44	0.13	***	53.5%
Use orthodox sources	0.46	0.14	***	55.6%
Trust food labels and internet	0.39	0.14	**	57.3%
<i>Constant</i>	<i>6.29</i>	<i>0.13</i>	***	
Final R square				57.8%
MIDDLE-AGED PEOPLE				
Trust orthodox sources	0.88	0.13	***	22.4%
Trust advertising and mass media	0.66	0.13	***	36.4%
Use unorthodox sources	-0.52	0.14	***	41.3%
Trust specialised media	-0.35	0.12	**	44.1%
<i>Constant</i>	<i>7.09</i>	<i>0.11</i>	**	
Final R square				44.1%

[over]

TABLE 1 [continued]

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
OLDER PEOPLE				
Trust orthodox sources	0.57	0.13	***	9.6%
Use unorthodox sources	-0.50	0.14	***	18.3%
Trust advertising and mass media	0.40	0.15	**	22.5%
<i>Constant</i>	<i>7.02</i>	<i>0.12</i>	***	
Final R square				22.5%

Note that analyses for this and the following tables were based on groups of the following sizes: women $n = 395$, men $n = 304$; young people (15-37 years) $n = 237$, middle-aged people (38-53 years) $n = 227$, older people (54-91 years) $n = 226$.

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$ for this and the following tables

TABLE 2
Multiple regression analysis of the *Meat is Necessary* score for sex and age groups

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
WOMEN				
Vegetarianism health concerns and appreciates meat	2.10	0.18	***	44.8%
Proportion of vegetarian friends	-0.89	0.20	***	50.9%
Number of vegetarian family members	-1.13	0.28	***	54.3%
Animal welfare, environmental and hunger benefits of vegetarianism	-0.78	0.19	***	56.2%
Red meat appreciation	-0.69	0.20	***	57.9%
<i>Constant</i>	<i>14.52</i>	<i>0.37</i>	***	
Final R square				57.9%
MEN				
Vegetarianism health concerns and appreciates meat	1.58	0.25	***	51.5%
Use unorthodox sources	-0.63	0.22	**	56.8%
Proportion of vegetarian friends	-0.63	0.20	**	59.2%
Animal welfare, environmental and hunger benefits of vegetarianism	-0.71	0.21	***	60.4%
Peace and contentment benefits of vegetarianism	-0.60	0.20	**	61.8%
<i>Constant</i>	<i>13.81</i>	<i>0.42</i>	***	
Final R square				61.8%
YOUNG PEOPLE				
Vegetarianism health concerns and appreciates meat	1.82	0.25	***	53.9%
Animal welfare, environmental and hunger benefits of vegetarianism	-1.27	0.22	***	59.1%
Peace and contentment benefits of vegetarianism	-1.15	0.22	***	62.0%
Health benefits of vegetarianism	-0.74	0.20	***	64.4%
Social influences against vegetarianism	0.60	0.18	***	65.9%
Social concerns about vegetarianism	0.75	0.24	**	67.5%
<i>Constant</i>	<i>12.92</i>	<i>0.20</i>	***	
Final R square				67.5%
MIDDLE-AGED PEOPLE				
Vegetarianism health concerns and appreciates meat	1.56	0.24	***	38.0%
Number of vegetarian family members	-1.91	0.42	***	48.2%
Trust advertising and mass media	0.78	0.21	***	51.5%
Trust orthodox sources	0.91	0.23	***	54.6%
Security and conformity values	-0.63	0.22	**	56.2%
Religion	1.37	0.45	**	58.0%
Male	1.13	0.40	**	60.0%
<i>Constant</i>	<i>10.50</i>	<i>0.72</i>	***	
Final R square				60.0%
OLDER PEOPLE				
Vegetarianism health concerns and appreciates meat	2.10	0.24	***	42.3%
Proportion of vegetarian friends	-1.02	0.30	***	46.5%
Moderate and successful values	0.66	0.23	**	49.8%
<i>Constant</i>	<i>14.70</i>	<i>0.51</i>	***	
Final R square				49.8%

TABLE 3
Multiple regression analysis of the *Meat is Necessary* score, with information sources as predictors, for sex and age groups

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
WOMEN				
Use unorthodox sources	-0.64	0.26	**	17.2%
Trust orthodox sources	1.29	0.24	***	26.0%
Trust advertising and mass media	1.34	0.21	***	34.1%
Trust specialised media	-0.55	0.21	**	35.7%
Trust unorthodox sources	-0.71	0.24	**	37.4%
Trust social sources	0.57	0.20	**	39.0%
Use orthodox sources	0.44	0.22	*	39.8%
<i>Constant</i>	<i>12.75</i>	<i>0.18</i>	***	
Final R square				39.8%
MEN				
Use unorthodox sources	-1.19	0.26	***	33.8%
Trust orthodox sources	1.20	0.20	***	39.7%
Trust advertising and mass media	1.05	0.22	***	44.3%
Trust unorthodox sources	-0.76	0.21	***	47.2%
Trust food labels and internet	-0.41	0.20	*	48.2%
<i>Constant</i>	<i>12.39</i>	<i>0.20</i>	***	
Final R square				48.2%
YOUNG PEOPLE				
Use unorthodox sources	-0.74	0.31	*	33.8%
Trust advertising and mass media	1.41	0.24	***	40.1%
Trust orthodox sources	1.43	0.24	***	46.6%
Trust unorthodox sources	-0.92	0.28	***	48.5%
Trust specialised media	-0.86	0.27	**	50.8%
Trust social sources	0.52	0.25	*	51.9%
<i>Constant</i>	<i>12.45</i>	<i>0.24</i>	***	
Final R square				51.9%
MIDDLE-AGED PEOPLE				
Use unorthodox sources	-0.75	0.31	*	19.7%
Trust orthodox sources	1.41	0.25	***	30.2%
Trust advertising and mass media	1.30	0.25	***	39.2%
Trust unorthodox sources	-0.60	0.28	*	40.7%
<i>Constant</i>	<i>12.57</i>	<i>0.21</i>	***	
Final R square				40.7%
OLDER PEOPLE				
Trust social sources	0.75	0.26	**	7.4%
Trust orthodox sources	0.81	0.27	**	13.2%
Use unorthodox sources	-0.74	0.30	*	17.0%
<i>Constant</i>	<i>14.18</i>	<i>0.30</i>	***	
Final R square				17.0%

TABLE 4
Multiple regression analysis of *Vegetarianism Health Concerns and Appreciates Meat* for sex and age groups

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
WOMEN				
Meat is a necessary dietary component	0.53	0.04	***	27.2%
Red meat appreciation	0.56	0.05	***	52.4%
Meat is not healthy	-0.20	0.04	***	58.3%
Lack of knowledge and convenience re vegetarianism	-0.15	0.04	***	59.8%
Trust orthodox sources	0.14	0.05	**	61.0%
Age	0.01	0.02	**	61.9%
Social concerns about vegetarianism	-0.11	0.04	**	62.9%
<i>Constant</i>	-0.30	0.12	*	
Final R square				62.9%
MEN				
Proportion of vegetarian friends	-0.15	0.04	***	35.0%
Red meat appreciation	0.40	0.04	***	47.9%
Meat is a necessary dietary component	0.37	0.04	***	60.2%
Trust unorthodox sources	-0.15	0.04	***	63.0%
Social concerns about vegetarianism	-0.18	0.04	***	65.1%
Social influences against vegetarianism	-0.14	0.04	***	67.1%
"Diet is important in preventing illness and disease"	-0.15	0.05	**	68.2%
Trust orthodox sources	0.13	0.04	***	69.3%
Lack of knowledge and convenience re vegetarianism	-0.13	0.04	***	70.7%
<i>Constant</i>	0.76	0.22	***	
Final R square				70.7%
YOUNG PEOPLE				
Meat is a necessary dietary component	0.50	0.04	***	31.0%
Red meat appreciation	0.54	0.04	***	57.8%
Meat is not healthy	-0.25	0.04	***	64.7%
Social concerns about vegetarianism	-0.21	0.05	***	66.9%
Social influences against vegetarianism	-0.11	0.04	**	68.0%
<i>Constant</i>	-0.12	0.04	**	
Final R square				68.0%
MIDDLE-AGED PEOPLE				
Meat is a necessary dietary component	0.53	0.05	***	22.8%
Red meat appreciation	0.48	0.05	***	43.8%
Meat is not healthy	-0.22	0.05	***	51.2%
Social concerns about vegetarianism	-0.19	0.05	***	54.7%
Lack of knowledge and convenience re vegetarianism	-0.12	0.05	**	56.3%
<i>Constant</i>	-0.07	0.05	NS	
Final R square				56.3%

[over]

TABLE 4 [continued]

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
OLDER PEOPLE				
Meat is a necessary dietary component	0.41	0.07	***	26.2%
Red meat appreciation	0.50	0.06	***	48.6%
Male	-0.48	0.11	***	53.9%
Trust social sources	0.21	0.05	***	56.8%
Health benefits of vegetarianism	-0.21	0.06	***	59.8%
Trust orthodox sources	0.18	0.06	**	63.3%
Social influences against vegetarianism	-0.13	0.06	*	64.9%
<i>Constant</i>	<i>0.75</i>	<i>0.17</i>	<i>***</i>	
Final R square				64.9%

TABLE 5
Multiple regression analysis of *Vegetarianism Health Concerns and Appreciates Meat*, with information sources as predictors, for sex and age groups

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
WOMEN				
Use unorthodox sources	-0.25	0.07	***	21.4%
Trust orthodox sources	0.32	0.06	***	28.3%
Trust advertising and mass media	0.22	0.06	***	30.9%
Trust unorthodox sources	-0.22	0.06	***	33.6%
Use specialised media b	-0.15	0.06	**	35.5%
<i>Constant</i>	-0.01	0.05	NS	
Final R square				35.5%
MEN				
Use unorthodox sources	-0.25	0.07	***	29.2%
Trust unorthodox sources	-0.24	0.05	***	33.3%
Trust orthodox sources	0.25	0.05	***	38.3%
Trust advertising and mass media	0.20	0.06	***	41.8%
<i>Constant</i>	-0.14	0.05	**	
Final R square				41.8%
YOUNG PEOPLE				
Use unorthodox sources	-0.29	0.07	***	34.0%
Trust orthodox sources	0.29	0.06	***	38.2%
Trust advertising and mass media	0.21	0.06	***	40.6%
Trust unorthodox sources	-0.22	0.07	***	43.3%
Use specialised media b	-0.12	0.06	*	44.7%
<i>Constant</i>	-0.14	0.06	**	
Final R square				44.7%
MIDDLE-AGED PEOPLE				
Use unorthodox sources	-0.18	0.08	*	18.0%
Trust orthodox sources	0.27	0.07	***	24.4%
Trust advertising and mass media	0.21	0.06	**	28.1%
Trust unorthodox sources	-0.22	0.07	**	31.6%
<i>Constant</i>	-0.03	0.06	NS	
Final R square				31.6%
OLDER PEOPLE				
Trust social sources	0.28	0.07	***	7.8%
Trust unorthodox sources	-0.27	0.08	***	14.2%
Use orthodox sources	0.25	0.08	***	21.4%
<i>Constant</i>	14.18	0.30	***	
Final R square				21.4%

TABLE 6
Multiple regression analysis of the *Meat is Unhealthy* score for sex and age groups

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
WOMEN				
Peace and contentment benefits of vegetarianism	1.29	0.15	***	15.4%
Animal welfare, environmental and hunger benefits of vegetarianism	1.20	0.16	***	31.8%
Health benefits of vegetarianism	0.95	0.14	***	42.1%
Number of vegetarian family members	0.88	0.26	***	44.5%
Security and conformity values	0.53	0.16	***	46.1%
Trust food labels and internet	-0.51	0.16	**	48.1%
Use authorities	-0.32	0.15	*	49.0%
<i>Constant</i>	<i>8.91</i>	<i>0.14</i>	***	
Final R square				49.0%
MEN				
Proportion of vegetarian friends	0.74	0.19	***	28.6%
Peace and contentment benefits of vegetarianism	1.33	0.18	***	36.2%
Health benefits of vegetarianism	1.09	0.19	***	43.4%
Animal welfare, environmental and hunger benefits of vegetarianism	1.11	0.19	***	50.1%
Power values	0.51	0.18	**	52.0%
"Diet is important in preventing illness and disease"	0.60	0.22	**	53.5%
<i>Constant</i>	<i>6.11</i>	<i>0.99</i>	***	
Final R square				53.5%
YOUNG PEOPLE				
Proportion of vegetarian friends	0.59	0.20	**	24.4%
Health benefits of vegetarianism	1.16	0.20	***	34.5%
Peace and contentment benefits of vegetarianism	1.09	0.22	***	40.6%
Animal welfare, environmental and hunger benefits of vegetarianism	0.94	0.21	***	46.9%
Male	1.67	0.40	***	49.8%
Trust non-orthodox sources	0.64	0.20	**	52.4%
Born outside of Australia	1.54	0.52	**	54.5%
<i>Constant</i>	<i>5.67</i>	<i>0.69</i>	***	
Final R square				54.5%
MIDDLE-AGED PEOPLE				
Peace and contentment benefits of vegetarianism	0.99	0.21	***	19.8%
Animal welfare, environmental and hunger benefits of vegetarianism	0.89	0.19	***	31.0%
Health benefits of vegetarianism	0.86	0.17	***	40.3%
Number of vegetarian family members	1.00	0.38	**	43.4%
Trust orthodox sources	-0.57	0.24	*	45.2%
<i>Constant</i>	<i>9.09</i>	<i>0.19</i>	***	
Final R square				45.2%

[over]

TABLE 6 [continued]

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
OLDER PEOPLE				
Health benefits of vegetarianism	1.10	0.22	***	12.5%
Peace and contentment benefits of vegetarianism	1.82	0.22	***	25.4%
Animal welfare, environmental and hunger benefits of vegetarianism	2.00	0.28	***	40.5%
"Diet is important in preventing illness and disease"	1.30	0.30	***	45.1%
Trust specialised media	-0.87	0.23	***	48.7%
Male	0.95	0.39	*	51.5%
Meat is a necessary dietary component	1.01	0.26	***	54.2%
Recall of the promotion of vegetarianism	1.65	0.48	***	57.3%
Use non-orthodox sources	-0.68	0.24	**	60.0%
<i>Constant</i>	<i>1.56</i>	<i>1.50</i>	NS	
Final R square				60.0%

TABLE 7
Multiple regression analysis of the *Meat is Unhealthy* score, with information sources as predictors, for sex and age groups

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
WOMEN				
Trust orthodox sources	-1.13	0.17	***	9.9%
Trust unorthodox sources	1.08	0.17	***	19.5%
Trust advertising and mass media	-0.63	0.16	***	24.0%
Trust specialised media	0.57	0.17	***	26.9%
<i>Constant</i>	<i>9.07</i>	<i>0.16</i>	***	
Final R square				26.9%
MEN				
Use unorthodox sources	1.45	0.24	***	24.2%
Trust orthodox sources	-0.87	0.21	***	28.6%
Trust specialised media	-0.59	0.21	**	31.8%
Trust advertising and mass media	-0.57	0.23	**	33.7%
<i>Constant</i>	<i>10.38</i>	<i>0.20</i>	***	
Final R square				33.7%
YOUNG PEOPLE				
Use unorthodox sources	0.92	0.29	**	23.5%
Use orthodox sources	-0.58	0.26	*	28.8%
Trust food labels and internet	-0.68	0.26	**	32.5%
Trust advertising and mass media	-0.75	0.23	***	34.4%
Trust orthodox sources	-0.72	0.26	**	35.7%
Trust unorthodox sources	0.75	0.27	**	38.1%
<i>Constant</i>	<i>9.48</i>	<i>0.23</i>	***	
Final R square				38.1%
MIDDLE-AGED PEOPLE				
Trust orthodox sources	-1.31	0.21	***	18.7%
Trust unorthodox sources	0.84	0.21	***	25.4%
Trust advertising and mass media	-0.52	0.20	**	28.0%
<i>Constant</i>	<i>9.18</i>	<i>0.20</i>	***	
Final R square				28.0%
OLDER PEOPLE				
Trust orthodox sources	-0.74	0.26	**	4.6%
Trust unorthodox sources	0.56	0.26	*	7.7%
<i>Constant</i>	<i>9.66</i>	<i>0.26</i>	***	
Final R square				7.7%

TABLE 8
Multiple regression analysis of *Health Benefits of Vegetarianism* for sex and age groups

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
WOMEN				
Meat is not healthy	0.55	0.07	***	7.8%
Trust unorthodox sources	0.16	0.06	**	11.8%
Meat is a necessary dietary component	-0.43	0.07	***	14.3%
Animal welfare, environmental and hunger benefits of vegetarianism	-0.46	0.08	***	17.3%
Peace and contentment benefits of vegetarianism	-0.36	0.07	***	22.2%
Red meat appreciation	-0.29	0.07	***	26.6%
<i>Constant</i>	<i>0.01</i>	<i>0.05</i>	NS	
Final R square				26.6%
MEN				
"I frequently look for information on healthy eating"	0.20	0.05	***	8.9%
Meat is not healthy	0.45	0.06	***	14.2%
Lack of knowledge and convenience re vegetarianism	0.18	0.05	***	18.5%
Meat is a necessary dietary component	-0.45	0.06	***	23.2%
Animal welfare, environmental and hunger benefits of vegetarianism	-0.41	0.07	***	27.3%
Peace and contentment benefits of vegetarianism	-0.36	0.06	***	32.7%
Red meat appreciation	-0.26	0.06	***	37.9%
<i>Constant</i>	<i>-0.71</i>	<i>0.16</i>	***	
Final R square				37.9%
YOUNG PEOPLE				
Meat is not healthy	0.46	0.06	***	12.8%
Meat is a necessary dietary component	-0.43	0.07	***	17.4%
Lack of knowledge and convenience re vegetarianism	0.18	0.06	**	21.3%
"I frequently look for information on healthy eating"	0.22	0.05	***	24.7%
Peace and contentment benefits of vegetarianism	-0.34	0.08	***	27.5%
Animal welfare, environmental and hunger benefits of vegetarianism	-0.35	0.07	**	31.3%
Red meat appreciation	-0.24	0.07	***	35.2%
<i>Constant</i>	<i>-0.77</i>	<i>0.20</i>	***	
Final R square				35.2%

[over]

TABLE 8 [continued]

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
MIDDLE-AGED PEOPLE				
Recall of the promotion of vegetarianism	0.51	0.14	***	6.4%
Lack of knowledge and convenience re vegetarianism	0.19	0.07	**	11.9%
Use unorthodox sources	0.30	0.08	***	15.8%
Animal welfare, environmental and hunger benefits of vegetarianism	-0.27	0.07	***	20.3%
"I do not need to make any changes to the food I eat as it is already healthy enough"	-0.20	0.06	**	23.8%
Meat is not healthy	0.26	0.07	***	27.0%
Anglo-Australian	-0.42	0.14	**	29.4%
Social concerns about vegetarianism	-0.19	0.07	**	31.8%
Use orthodox sources	0.20	0.07	**	34.0%
Use social sources	-0.16	0.07	*	36.0%
<i>Constant</i>	<i>0.70</i>	<i>0.24</i>	<i>**</i>	
Final R square				36.0%
OLDER PEOPLE				
Vegetarianism health concerns and appreciates meat	-0.37	0.09	***	10.6%
"Diet is important in preventing illness and disease"	0.28	0.11	**	17.8%
Trust social sources	0.21	0.08	**	21.9%
Security and conformity values	0.17	0.08	*	25.1%
<i>Constant</i>	<i>-1.23</i>	<i>0.48</i>	<i>**</i>	
Final R square				25.1%

TABLE 9
Multiple regression analysis of *Health Benefits of Vegetarianism*, with information sources as predictors, for sex and age groups

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
WOMEN				
Trust unorthodox sources	0.20	0.07	**	6.4%
Use unorthodox sources	0.18	0.07	**	8.5%
<i>Constant</i>	-0.10	0.06	NS	
Final R square				8.5%
MEN				
Use unorthodox sources	0.23	0.06	***	5.8%
<i>Constant</i>	0.10	0.06	NS	
Final R square				5.8%
YOUNG PEOPLE				
Use unorthodox sources	0.20	0.06	***	5.1%
<i>Constant</i>	0.01	0.07	NS	
Final R square				5.1%
MIDDLE-AGED PEOPLE				
Trust unorthodox sources	0.28	0.08	***	6.4%
Use orthodox sources	0.18	0.09	*	8.8%
<i>Constant</i>	0.06	0.07	NS	
Final R square				8.8%
OLDER PEOPLE				
Trust unorthodox sources	0.22	0.08	**	5.5%
<i>Constant</i>	-0.04	0.08	NS	
Final R square				5.5%

APPENDIX 12

Cross-tabulation Results of Frequency of Animal Food Consumption, Meat Beliefs and Barriers and Benefits of Vegetarianism for Vegetarians, Prospective Vegetarians and Omnivores (Pooled Samples)

TABLE 1
Differences between vegetarians', prospective vegetarians' and omnivores' frequency of consumption of animal foods[†]

FOOD	Vegetarians (V)	Prospective Vegetarians (PV) %	Omnivores (O)	<i>p</i> V, PV	<i>p</i> PV, O
Red meat				***	***
Never	97.1	0	0.2		
Rarely	2.9	9.9	2.6		
1-3 times per month	0	28.4	13.3		
1-4 times per week	0	54.3	71.4		
Daily or almost daily	0	7.4	12.5		
White meat				***	NS
Never	95.1	1.2	0.2		
Rarely	4.9	6.2	1.9		
1-3 times per month	0	14.8	17.0		
1-4 times per week	0	71.6	76.1		
Daily or almost daily	0	6.2	4.7		
Fish and seafood				***	NS
Never	85.3	2.5	1.5		
Rarely	8.8	13.6	13.6		
1-3 times per month	4.9	32.1	41.0		
1-4 times per week	1.0	50.6	42.5		
Daily or almost daily	0	1.2	1.3		
Eggs				***	NS
Never	36.9	0	0.6		
Rarely	23.3	15.0	10.8		
1-3 times per month	13.6	25.0	34.0		
1-4 times per week	23.3	52.5	49.4		
Daily or almost daily	2.9	7.5	5.2		
Dairy				***	**
Never	30.1	1.2	0.4		
Rarely	17.5	14.8	4.7		
1-3 times per month	8.7	3.7	5.2		
1-4 times per week	14.6	25.9	21.1		
Daily or almost daily	29.1	54.3	68.5		

[†]For this and the following tables, the *p*-values for comparisons between vegetarians and prospective vegetarians, and between prospective vegetarians and omnivores are also given.

Analyses for this and the following tables were based on the following (maximum possible) group sizes: vegetarian *n* = 103, prospective vegetarian *n* = 81, omnivore *n* = 468.

*** *p* < 0.001, ** *p* < 0.01, * *p* < 0.05 for this and the following tables

TABLE 2
Differences between vegetarians', prospective vegetarians' and omnivores' beliefs about meat

ITEM	Vegetarians (V)	Prospective Vegetarians (PV)	Omnivores (O)	<i>p</i> V, PV	<i>p</i> PV, O
	% Agree (% Unsure)				
I love to eat red meat such as beef, veal or lamb	0 (1)	60 (10)	86 (5)	***	***
I prefer to eat red meat more than fruit or vegetables	0 (1)	12 (16)	23 (12)	***	NS
I think meat is disgusting	71 (12)	11 (7)	1 (5)	***	***
Nothing satisfies my appetite like a thick juicy steak	0 (0)	19 (12)	32 (13)	***	NS
Meat such as beef or lamb is unhealthy to eat	64 (13)	13 (17)	2 (7)	***	***
Red meat such as beef or lamb is fattening	46 (28)	16 (13)	10 (15)	***	NS
Meat is necessary in the adult human diet	1 (3)	46 (21)	72 (15)	***	***
Meat is important for the health of babies and toddlers	2 (12)	37 (28)	43 (41)	***	***
Meat is necessary in children's diets	0 (11)	53 (20)	69 (26)	***	***
Meat causes cancer	46 (37)	10 (37)	1 (35)	***	***
Meat causes heart disease	55 (28)	13 (36)	6 (35)	***	NS
Red meat is the best-absorbed source of dietary iron	17 (26)	46 (32)	53 (40)	***	***
Non-vegetarians are healthier than vegetarians	2 (4)	12 (35)	15 (46)	***	NS
Red meat is very expensive	30 (57)	49 (10)	47 (12)	***	NS
When I eat out to celebrate a social occasion, I usually eat some kind of red meat	0 (0)	40 (8)	45 (12)	***	NS
Meat is important for building strength	5 (7)	53 (21)	64 (29)	***	***
Meat is more a food that men are likely to eat	35 (24)	60 (13)	50 (20)	**	NS
Meat production is cruel to animals	93 (4)	39 (22)	15 (27)	***	***
Humans have no right to kill animals for food	69 (16)	17 (14)	6 (13)	***	**
Vegetarians are hippies or weirdos	7 (4)	4 (7)	8 (15)	NS	*

TABLE 3
Differences between vegetarians', prospective vegetarians' and omnivores' perceived barriers to the consumption of a vegetarian diet

ITEM	Vegetarians (V)	Prospective Vegetarians (PV)	Omnivores (O)	<i>p</i> V, PV	<i>p</i> PV, O
	% Agree (% Unsure)				
My friends eat meat	18 (3)	25 (7)	33 (14)	NS	*
My family eats meat	20 (4)	38 (9)	44 (10)	**	NS
I like eating meat	1 (3)	74 (9)	84 (8)	***	*
I would (or do) feel conspicuous among others	8 (7)	16 (16)	7 (21)	*	*
There is not enough iron in vegetarian diets	4 (7)	24 (26)	30 (40)	***	**
There is not enough protein in vegetarian diets	1 (4)	21 (21)	24 (41)	***	***
I would be (or am) worried about my health (other than lack of iron or protein)	3 (5)	29 (9)	30 (33)	***	***
Someone else decides on most of the food I eat	1 (2)	7 (3)	11 (8)	NS	NS
My family/spouse/partner won't eat vegetarian food	5 (5)	27 (8)	32 (15)	***	NS
It takes too long to prepare vegetarian food	1 (0)	3 (17)	9 (37)	***	***
I don't want to eat strange or unusual foods	0 (3)	24 (9)	22 (15)	***	NS
Vegetarian options are not available where I shop or in the canteen or at my home	12 (7)	10 (15)	14 (22)	NS	NS
I don't have enough willpower	2 (1)	23 (13)	20 (17)	***	NS
I think humans are meant to eat meat	0 (3)	32 (18)	50 (26)	***	***
It is inconvenient	5 (3)	13 (17)	25 (28)	***	***
I don't know what to eat instead of meat	4 (1)	10 (13)	24 (18)	***	**
I lack the right cooking skills	1 (0)	15 (8)	16 (16)	***	NS
I do not want to change my eating habit or routine	4 (3)	41 (13)	62 (17)	***	***
There is too limited a choice when I eat out	31 (6)	30 (16)	36 (22)	NS	NS
People would (or do) think that I'm a wimp or not "macho" enough	5 (5)	4 (8)	3 (12)	NS	NS
Vegetarian diets are not filling enough	3 (1)	17 (17)	19 (34)	***	**
Vegetarian diets are boring	1 (1)	20 (16)	25 (34)	***	***
I don't want people to stereotype me negatively (e.g. that I must be strange)	5 (4)	9 (3)	7 (16)	NS	**
I wouldn't (or don't) get enough energy or strength from the food	2 (3)	8 (17)	18 (37)	***	***
I need more information about vegetarian diets	14 (9)	41 (15)	42 (17)	***	NS

TABLE 4
Differences between vegetarians', prospective vegetarians' and omnivores' perceived benefits of the consumption of a vegetarian diet

ITEM	Vegetarians (V)	Prospective Vegetarians (PV)	Omnivores (O)	<i>p</i> V, PV	<i>p</i> PV, O
		% Agree (% Unsure)			
Control my weight	56 (23)	63 (20)	33 (32)	NS	***
Prevent disease in general (e.g. heart disease, cancer)	89 (10)	67 (23)	24 (44)	***	***
Decrease saturated fat intake in my diet	89 (9)	85 (12)	60 (24)	NS	***
Live longer	73 (25)	47 (42)	9 (50)	***	***
Eat a greater variety of interesting foods	88 (8)	60 (30)	16 (34)	***	***
Have plenty of energy	80 (19)	60 (30)	9 (50)	**	***
Have a better quality of life	88 (11)	50 (33)	6 (39)	***	***
Stay healthy	94 (6)	69 (19)	18 (41)	***	***
Be less aggressive	41 (37)	23 (46)	3 (34)	*	***
Be more content with myself	85 (12)	36 (35)	3 (36)	***	***
Save money	52 (24)	37 (34)	16 (38)	NS	***
Have a tastier diet	90 (8)	25 (45)	4 (33)	***	***
Satisfy my religious and/or spiritual needs	69 (11)	13 (22)	2 (18)	***	***
Be fit	72 (21)	49 (23)	12 (35)	***	***
Eat more fruit and vegetables	94 (2)	91 (4)	71 (12)	NS	***
Be healthier by decreasing my intake of chemicals, steroids and antibiotics which are found in meat	93 (6)	62 (21)	21 (48)	***	***
Increase my control over my own health	89 (8)	55 (30)	13 (40)	***	***
Lower my chances of getting food poisoning	76 (17)	39 (27)	12 (35)	***	***
Help the environment	97 (3)	48 (31)	13 (37)	***	***
Decrease hunger in the Third World	78 (15)	28 (42)	8 (39)	***	***
Help animal welfare/rights	99 (1)	58 (29)	28 (32)	***	***
Increase the efficiency of food production	85 (13)	32 (51)	8 (43)	***	***
Help the feminist cause	21 (53)	10 (42)	2 (25)	**	***
Create a more peaceful world	82 (14)	26 (32)	2 (23)	***	***

APPENDIX 13

Multiple Regression Analysis Results of *Animal Welfare, Environmental and Hunger Benefits of Vegetarianism* for Non-Vegetarians and Vegetarians (Pooled Samples)

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R sq.</i>
NON-VEGETARIANS				
Peace and contentment benefits of vegetarianism	-0.39	0.04	***	11.2%
Universal values	0.15	0.04	***	15.8%
Health benefits of vegetarianism	-0.22	0.04	***	19.2%
Meat is not healthy	0.37	0.05	***	23.5%
Red meat appreciation	-0.26	0.04	***	25.8%
Meat is a necessary dietary component	-0.28	0.05	***	31.0%
<i>Constant</i>	<i>-0.14</i>	<i>0.04</i>	***	
Final R square				31.0%
VEGETARIANS				
Peace and contentment benefits of vegetarianism	-0.40	0.07	***	18.8%
Use orthodox sources	-0.25	0.07	***	27.2%
Health benefits of vegetarianism	-0.22	0.07	***	33.8%
Use unorthodox sources	0.17	0.06	**	38.8%
<i>Constant</i>	<i>1.39</i>	<i>0.11</i>	***	
Final R square				38.8%

Analyses were based on groups of the following sizes: non-vegetarian $n = 546$, vegetarian $n = 103$ (respondents identified their own dietary status).

*** $p < 0.001$, ** $p < 0.01$

BIBLIOGRAPHY

- Achterberg, C. (1988). Qualitative methods in nutrition education evaluation research. *Journal of Nutrition Education*, 20(5), 244-250.
- Adams, C. J. (1990). *The Sexual Politics of Meat: a feminist-vegetarian critical theory*. New York: Continuum.
- Ajzen, I. (1985). From intentions to actions; a theory of planned behavior. In J. Kuhl & J. Beckman (Eds.), *Action-Control: from cognition to behavior* (pp. 11-39). Heidelberg: Springer.
- Ajzen, I. (1989). Attitude structure and behavior. In A. R. Pratkanis & S. J. Breckler & A. G. Greenwald (Eds.), *Attitude Structure and Function* (pp. 241-274). Hillsdale, New Jersey: Lawrence Erlbaum Associates.
- Alexander, D., Ball, M. J., & Mann, J. (1994). Nutrient intake and haematological status of vegetarians and age-sex matched omnivores. *European Journal of Clinical Nutrition*, 48, 538-546.
- Allen, M. W., & Baines, S. (2001). Manipulating the symbolic meaning of meat to encourage greater acceptance of fruits and vegetables and less proclivity for red and white meat. *Appetite*; under review.
- Allen, M. W., Wilson, M., Ng, S. H., & Dunne, M. (2000). Values and beliefs of vegetarians and omnivores. *The Journal of Social Psychology*, 140(4), 405-422.
- Amato, P. R., & Partridge, S. A. (1989). *The New Vegetarians: promoting health and protecting life*. New York: Plenum Press.
- American Dietetic Association. (1995). Position of the American Dietetic Association: world hunger. *Journal of the American Dietetic Association*, 95(10), 1160-1162.
- American Dietetic Association. (1996). Position of the American Dietetic Association: nutrition education for the public. *Journal of the American Dietetic Association*, 96(11), 1183-1187.
- American Dietetic Association. (1997a). American Dietetic Association 1997 Nutrition Trends Survey: key findings. Chicago: American Dietetic Association.
- American Dietetic Association. (1997b). How many vegetarians are there? *Journal of the American Dietetic Association*, 97(11), 1287.
- American Dietetic Association. (1997c). Position of the American Dietetic Association: vegetarian diets. *Journal of the American Dietetic Association*, 97(11), 1317-1321.
- American Dietetic Association. (2000). Position of the American Dietetic Association: Nutrition, aging and the continuum of care. *Journal of the American Dietetic Association*, 100(5), 580-595.
- Appleby, P. N., Thorogood, M., Mann, J. I., & Key, T. J. (1998). Low body mass index in non-meat eaters: the possible roles of animal fat, dietary fibre and alcohol. *International Journal of Obesity and Related Metabolic Disorders*, 22(5), 454-460.
- Appleby, P. N., Thorogood, M., Mann, J. I., & Key, T. J. A. (1999). The Oxford Vegetarian Study: an overview. *American Journal of Clinical Nutrition*, 70(suppl.), S525-S531.

- Arcury, T. A., Quandt, S. A., Bell, R. A., McDonald, J., & Vitolins, M. Z. (1998). Barriers to nutritional well being for rural elders: community experts' perceptions. *The Gerontologist*, 38(4), 490-498.
- Assael, H. (1992). *Consumer Behavior and Marketing Action* (4th ed.). Boston: PWS-Kent.
- Australian Bureau of Statistics. (1995). National Nutrition Survey data.
- Australian Bureau of Statistics. (1996). Basic Community Profile software, 1996 *Census of Population and Housing*. Canberra: Australian Bureau of Statistics.
- Australian Bureau of Statistics. (1997). *National Nutrition Survey Selected Highlights Australia 1995*. Canberra: Australian Government Publishing Service.
- Australian Bureau of Statistics. (2001a). *Australia Now - A statistical profile: Agriculture*, [On-line]. Available: <http://www.abs.gov.au/> [2001, September 14].
- Australian Bureau of Statistics. (2001b). *Australia Now - A statistical profile: Environment*, [On-line]. Available: <http://www.abs.gov.au/> [2001, September 14].
- Australian Bureau of Statistics. (2001c). *Australia Now - A statistical profile: Health*, [On-line]. Available: <http://www.abs.gov.au/> [2001, July 15].
- Axelson, M. L. (1986). The impact of culture on food-related behavior. *Annual Review of Nutrition*, 6, 345-363.
- Babbie, E. (1989). *The Practice of Social Research* (5th ed.). Belmont, California: Wadsworth Publishing Company.
- Baghurst, K. (1999). Red meat consumption in Australia: intakes, contributions to nutrient intake and associated dietary patterns. *European Journal of Cancer Prevention*, 8, 185-191.
- Balch, G. I., Loughrey, K., Weinberg, L., Lurie, D., & Eisner, E. (1997). Probing consumer benefits and barriers for the national 5 A Day campaign: focus group findings. *Journal of Nutrition Education*, 29, 178-183.
- Ball, M. J., & Ackland, M. L. (2000). Zinc intake and status in Australian vegetarians. *British Journal of Nutrition*, 83(1), 27-33.
- Ball-Rokeach, S. J., Rokeach, M., & Grube, J. W. (1984). *The Great American Values Test: influencing behavior and belief through television*. New York: Free Press.
- Baranowski, T., Weber Cullen, K., & Baranowski, J. (1999). Psychosocial correlates of dietary intake: advancing dietary intervention. *Annual Review of Nutrition*, 19, 17-40.
- Barker, M. E., Tandy, M., & Stookey, J. D. (1999). How are consumers of low-fat and high-fat diets perceived by those with lower and higher fat intake? *Appetite*, 33, 309-317.
- Barker, M. E., Thompson, K. A., & McLean, S. I. (1995). Attitudinal dimensions of food choice and nutrient intake. *British Journal of Nutrition*, 74, 649-659.
- Barnard, N. D., Nicholson, A., & Howard, J. L. (1995). The medical costs attributable to meat consumption. *Preventive Medicine*, 24, 646-655.
- Beard, L., Wyllie, A., & Caswell, S. (1989). *Towards understanding eating habits in New Zealand: a qualitative investigation*. Auckland: Department of Community Health, University of Auckland.
- Beardsworth, A., & Keil, E. (1993). Contemporary vegetarianism in the U.K.: challenge and incorporation. *Appetite*, 20, 229-234.

- Beardsworth, A., & Keil, T. (1991). Health-related beliefs and dietary practices among vegetarians and vegans: a qualitative study. *Health Education Journal*, 50(1), 38-42.
- Beardsworth, A., & Keil, T. (1992). The vegetarian option: varieties, conversions, motives and careers. *The Sociological Review*, 40, 253-293.
- Beardsworth, A., & Keil, T. (1997). *Sociology on the Menu*. London: Routledge.
- Begley, A., & Cardwell, G. (1996). The reliability and readability of nutrition information in Australian women's magazines. *Australian Journal of Nutrition and Dietetics*, 53, 160-166.
- Beilin, L. J. (1993). Vegetarian diets, alcohol consumption, and hypertension. In L. Kyu Taik & O. Yasaburo (Eds.), *The Third International Conference on Nutrition in Cardio-Cerebrovascular Diseases. Annals of the New York Academy of Sciences* (Vol. 676, pp. 83-91). New York: New York Academy of Sciences.
- Beilin, L. J. (1994). Vegetarian and other complex diets, fats, fiber and hypertension. *American Journal of Clinical Nutrition*, 59(suppl.), S1130-S1135.
- Bender, M. M., & Derby, B. M. (1992). Prevalence of reading nutrition and ingredient information on food labels among adult Americans: 1982-1988. *Journal of Nutrition Education*, 24(6), 292-297.
- Bingham, S. A. (1999). High-meat diets and cancer risk. *Proceedings of the Nutrition Society*, 58, 243-248.
- Booth, S. L., Sallis, J. F., Ritenbaugh, C., Hill, J. O., Birch, L. L., Frank, L. D., Glanz, K., Himmelgreen, D. A., Mudd, M., Popkin, B. M., Rickard, K. A., St. Jeor, S., & Hays, N. P. (2001). Environmental and societal factors affect food choice and physical activity: rationale, influences, and leverage points. *Nutrition Reviews*, 59(3), S21-S39.
- Brucks, M. (1985). The effects of product class knowledge on information search behaviour. *Journal of Consumer Research*, 12(1), 1-16.
- Brug, J., Glanz, K., & Kok, G. (1997). The relationship between self-efficacy, attitudes, intake compared to others, consumption, and stages of change related to fruit and vegetables. *American Journal of Health Promotion*, 12(1), 25-30.
- Brug, J., Lechner, L., & De Vries, H. (1995). Psychosocial determinants of fruit and vegetable consumption. *Appetite*, 25, 285-296.
- Buisson, D., & Garrett, T. (1996). *Impact of global social and marketing trends on marketing nutrition with particular reference to the Asia Pacific region*. Paper presented at the Multidisciplinary Approaches to Food Choice: Food Choice Conference, Adelaide, Australia.
- Buttriss, J. L. (1997). Food and nutrition: attitudes, beliefs, and knowledge in the United Kingdom. *American Journal of Clinical Nutrition*, 65, S1985-S1995.
- Cannon, G. (1999). Feeding the world a healthy diet. In G. Tansey & J. D'Silva (Eds.), *The Meat Business: devouring a hungry planet* (pp. 103-119). New York: St. Martin's Press.
- Cashel, K. M., Crawford, D., & Deakin, V. (2000). Milk choices made by women: what influences them, and does it impact on calcium intake? *Public Health Nutrition*, 3(4), 403-410.
- Charles, N., & Kerr, M. (1986). Food for feminist thought. *The Sociological Review*, 34(3), 537-572.

- Chitwood, C., McIntosh, W. A., & Kubena, K. S. (1994-95). Physicians' knowledge of dietary fat and advice to patients. *Community Health Education*, 15(1), 53-64.
- Conner, M. (1994). Accounting for gender, age and socioeconomic differences in food choice. *Appetite*, 23, 195.
- Conner, M., & Norman, P. (1996). The role of social cognition in health behaviours. In M. Conner & P. Norman (Eds.), *Predicting Health Behaviour: research and practice with social cognition models* (pp. 1-22). Buckingham: Open University Press.
- Conroy, W. J. (1979). Human values, smoking behavior, and public health programs. In M. Rokeach (Ed.), *Understanding Human Values: individual and societal* (pp. 199-209). New York: Free Press.
- Contento, I., Balch, G. I., Bronner, Y. L., Paige, D. M., Gross, S. M., Bisignani, L., Lytle, L. A., Maloney, S. K., White, S. L., Olson, C. M., & Sharaga Swadener, S. (1995). The effectiveness of nutrition education and implications for nutrition education policy, programs, and research: a review of research. *Journal of Nutrition Education*, 27(6), 275-422.
- Contento, I. R., & Murphy, B. M. (1990). Psycho-social factors differentiating people who reported making desirable changes in their diets from those who did not. *Society for Nutrition Education*, 22(1), 6-14.
- Cooper, C. K., Wise, T. N., & Mann, L. S. (1985). Psychological and cognitive characteristics of vegetarians. *Psychosomatics*, 26(6), 521-527.
- Coriolis Research. (2000). Organics in the United Kingdom: market overview [draft, version 2]: unpublished manuscript.
- Corner, J. (1996). Reappraising reception: aims, concepts and methods. In J. Curran & M. Gurevitch (Eds.), *Mass Media and Society* (2nd ed., pp. 280-304). London: Arnold.
- Cosper, B. A., & Wakefield, L. M. (1975). Food choices of women. *Journal of the American Dietetic Association*, 66, 152-155.
- Coveney, J., & Santich, B. (1997). A question of balance: nutrition, health and gastronomy. *Appetite*, 28, 267-277.
- Cox, D. N., Anderson, A. S., Lean, M. E. J., & Mela, D. J. (1998). UK consumer attitudes, beliefs and barriers to increasing fruit and vegetable consumption. *Public Health Nutrition*, 1(1), 61-68.
- Craig-Lees, M., Joy, S., & Browne, B. (1995). *Consumer Behaviour*. Brisbane: John Wiley and Sons.
- Crawford, D., & Worsley, A. (1985). A preliminary investigation of consumer views and behaviours regarding food labelling. *Food Technology in Australia*, 38(2), 74-76.
- Crawford, D. A., & Baghurst, K. I. (1990). Diet and health: a national survey of beliefs, behaviours and barriers to change in the community. *Australian Journal of Nutrition and Dietetics*, 47(4), 97-104.
- Culverwell, J., & Eder, M. (1982). Making the best of shelf space. *Marketing*, 10(9), 31-33.
- de Almeida, M. D. V., Graca, P., Lappalainen, R., Giachetti, I., Kafatos, A., de Winter, A. M. R., & Kearney, J. M. (1997). Sources used and trusted by nationally-representative adults in the European Union for information on healthy eating. *European Journal of Clinical Nutrition*, 51(suppl. 2), S16-S22.

- de Graaf, C., Van der Gaag, M., Kafatos, A., Lennernas, M., & Kearney, J. M. (1997). Stages of dietary change among nationally-representative samples of adults in the European Union. *European Journal of Clinical Nutrition*, 51(suppl. 2), S47-S56.
- Denzin, N. K. (1978). *The Research Act: a theoretical introduction to sociological methods* (2nd ed.). New York: McGraw-Hill.
- Dervin, B. (1983). *An overview of sense-making research: concepts, methods and results*. Paper presented at the Meeting of the International Communication Association, Dallas, Texas.
- Devine, C. M., Wolfe, W. S., Frongillo, E. A., & Bisogni, C. A. (1999). Life-course events and experiences: association with fruit and vegetable consumption in 3 ethnic groups. *Journal of the American Dietetic Association*, 99(3), 309-314.
- Dietitians Association of Australia. (2000). DAA Media Background Statement. Fruit and Vegetables.
- Dietz, T., Frisch, A. S., Kalof, L., Stern, P. C., & Guagnano, G. A. (1995). Values and vegetarianism: an exploratory analysis. *Rural Sociology*, 60(3), 533-542.
- Dietz, T., Guagnano, G. A., & Stern, P. C. (1994). U.S. National Telephone Survey on Environmental Values. Fairfax, Virginia: Northern Virginia Survey Research Laboratory, George Mason University.
- Dillman, D. A. (1978). *Mail and Telephone Surveys: the total design method*. Washington: John Wiley and Sons.
- Douglas, M. (1972). Deciphering a meal. *Daedalus*, 101(1), 61-81.
- Dunlap, R. E., & Van Liere, K. D. (1978). The new environmental paradigm: a proposed measuring instrument. *The Journal of Environmental Education*, 9, 10-19.
- Dwyer, J. (1999). Convergence of plant-rich and plant-only diets. *American Journal of Clinical Nutrition*, 70(3), S620-S622.
- Dwyer, J. T. (1988). Health aspects of vegetarian diets. *American Journal of Clinical Nutrition*, 48, 712-738.
- Dwyer, J. T. (1991). Nutritional consequences of vegetarianism. *Annual Review of Nutrition*, 11, 61-91.
- Dwyer, J. T., Kandel, R. F., Mayer, L. D. V. H., & Mayer, J. (1974). The "new" vegetarians. Group affiliation and dietary strictures related to attitudes and life style. *Journal of The American Dietetic Association*, 64(4), 376-382.
- Dwyer, J. T., Mayer, L. D. V. H., Kandel, R. F., & Mayer, J. (1973). The new vegetarians. Who are they? *Journal of the American Dietetic Association*, 62, 503-509.
- Eagly, A. H., & Chaiken, S. (1993). *The Psychology of Attitudes*. Ft. Worth, Texas: Harcourt Brace Jovanovich.
- Economos, C. D., Brownson, R. C., DeAngelis, M. A., Foerster, S. B., Tucker Foreman, C., Gregson, J., Kumanyika, S. K., & Pate, R. R. (2001). What lessons have been learned from other attempts to guide social change? *Nutrition Reviews*, 59(3), S40-S56.
- Elmståhl, S., Holmqvist, O., Gullberg, B., Johansson, U., & Berglund, G. (1999). Dietary patterns in high and low consumers of meat in a Swedish cohort study. *Appetite*, 32, 191-206.
- Encarta World English Dictionary. (1999). Sydney: Macmillan.
- Engel, J. F., Blackwell, R. D., & Miniard, P. W. (1995). *Consumer Behavior* (8th ed.). Forth Worth, USA: Dryden Press.

- Epstein, S. (1994). Integration of the cognitive and the psychodynamic unconscious. *American Psychologist*, 49(8), 709-724.
- Evans, A., Booth, H., & Cashel, K. (2000). Sociodemographic determinants of energy, fat and dietary fibre intake in Australian adults. *Public Health Nutrition*, 3(1), 67-75.
- Fabrigar, L. R., Priester, J. R., Petty, R. E., & Wegener, D. T. (1998). The impact of attitude accessibility on elaboration of persuasive messages. *Personality and Social Psychology Bulletin*, 24(4), 339-352.
- Fagerli, R. A., & Wandel, M. (1999). Gender differences in opinions and practices with regard to a "healthy diet". *Appetite*, 32, 171-190.
- Falconer, H., Baghurst, K. I., & Rump, E. E. (1993). Nutrient intakes in relation to health-related aspects of personality. *Journal of Nutrition Education*, 25(6), 307-319.
- Falk, L. W., Sobal, J., Bisogni, C. A., Connors, M., & Devine, C. M. (2001). Managing healthy eating: definitions, classifications, and strategies. *Health Education and Behavior*, 28(4), 425-439.
- Famodu, A. A., Osilesi, O., Makinde, Y. O., & Osonuga, O. A. (1998). Blood pressure and blood lipid levels among vegetarian, semi-vegetarian, and non-vegetarian native Africans. *Clinical Biochemistry*, 31(7), 545-549.
- Feather, N., Norman, M., & Worsley, A. (1998). Values and valences: variables relating to the attractiveness and choice of food. *Journal of Applied Social Psychology*, 28(7), 639-656.
- Feather, N. T. (1982). Human values and the prediction of action: an expectancy-valence analysis. In N. T. Feather (Ed.), *Expectations and Actions: expectancy-value models in psychology* (pp. 263-289). Hillsdale, New Jersey: Lawrence Erlbaum Associates.
- Feick, L. W., Herrmann, R. O., & Warland, R. H. (1986). Search for nutrition information: a probit analysis of the use of different information sources. *The Journal of Consumer Affairs*, 20(2), 173-192.
- Festinger, L. (1957). *A Theory of Cognitive Dissonance*. Stanford, CA: Stanford University Press.
- Fiddes, N. (1991). *Meat: a natural symbol*. London: Routledge.
- Fiddes, N. (1994). Social aspects of meat eating. *Proceedings of the Nutrition Society*, 53, 271-280.
- Fieldhouse, P. (1986). *Food and Nutrition: customs and culture*. London: Croom Helm.
- Fischler, C. (1980). Food habits, social change and the nature/culture dilemma. *Social Science Information*, 19(6), 937-953.
- Fishbein, M., & Ajzen, I. (1975). *Belief, Attitude, Intention, and Behavior: an introduction to theory and research*. Reading, MA: Addison-Wesley.
- Flight, I., Moore, V., & Worsley, A. (2001). Socio-economic differences in periconceptional folate use and sources of information that influence such use. Department of Public Health, University of Adelaide & CSIRO Health Sciences and Nutrition, Adelaide: unpublished manuscript.
- Food and Agriculture Organization. (1996). *The Sixth World Food Survey*. Rome, Italy: Food and Agriculture Organization of the United Nations.
- Forgas, J., & Jolliffe, C. J. (1994). How conservative are greenies? Environmental attitudes, conservatism, and traditional morality among university students. *Australian Journal of Psychology*, 46(3), 123-130.

- Forsyth, A., MacIntyre, S., & Anderson, A. (1994). Diets for disease? Intraurban variation in reported food consumption in Glasgow. *Appetite*, 22, 259-274.
- Fray, P. (1991). On fertile ground? The sustainable agriculture debate. *Habitat*, 19(2), 4-8.
- Freeland-Graves, J., Greninger, S. A., Graves, G. R., & Young, R. K. (1986). Health practices, attitudes, and beliefs of vegetarians and nonvegetarians. *Journal of the American Dietetic Association*, 86(7), 913-918.
- Freeland-Graves, J. H., Greninger, S. A., & Young, R. K. (1986). A demographic and social profile of age- and sex-matched vegetarians and non-vegetarians. *Journal of the American Dietetic Association*, 86(7), 907-913.
- Frey, D. (1986). Recent research on selective exposure to information. *Advances in Experimental Social Psychology*, 19, 41-80.
- Fries, E., & Croyle, R. T. (1993). Stereotypes associated with a low-fat diet and their relevance to nutrition and education. *Journal of the American Dietetic Association*, 93, 551-555.
- Furnham, A., & Forey, J. (1994). The attitudes, behaviors and beliefs of patients of conventional vs. complementary (alternative) medicine. *Journal of Clinical Psychology*, 50(3), 458-469.
- Furst, T., Connors, M., Bisogni, C. A., Sobal, J., & Falk, L. W. (1996). Food choice; a conceptual model of the process. *Appetite*, 26, 247-266.
- Gallup. (1997). *The Realeat Survey 1997 - changing attitudes to meat consumption*. Newport Pagnell: Haldane Foods.
- Geiger, S., & Newhagen, J. (1993). Revealing the black box: information processing and media effects. *Journal of Communication*, 43(4), 42-50.
- Glanz, K., Lankenau, B., Foerster, S., Temple, S., Mullis, R., & Schmid, T. (1995). Environmental and policy approaches to cardiovascular disease prevention through nutrition: opportunities for state and local action. *Health Education Quarterly*, 22(4), 512-527.
- Goldberg, J. P., & Hellwig, J. P. (1997). Nutrition research in the media: the challenge facing scientists. *Journal of the American College of Nutrition*, 16(6), 544-550.
- Goode, J., Beardsworth, A. D., Keil, T., Sherratt, E., & Haslam, C. (1996). Changing the nation's diet: a study of responses to current nutritional messages. *Health Education Journal*, 55, 285-299.
- Graber, D. A. (1984). *Processing the News*. New York: Longman.
- Green, L. W. (1984). Modifying and developing health behavior. *Annual Review of Public Health*, 5, 215-236.
- Green, L. W., & Kreuter, M. W. (1992). CDC's planned approach to community health as an application of PRECEED and an inspiration for PROCEED. *Journal of Health Education*, 23(3), 140-147.
- Grube, J. W., Mayton, D. M., & Ball-Rokeach, S. J. (1994). Inducing change in values, attitudes, and behaviors: belief system theory and the method of value self-confrontation. *Journal of Social Issues*, 50(4), 153-173.
- Grunert, K. G., Brunso, K., & Bisp, S. (1993). Food-related life-style: development of a cross-culturally valid instrument for market surveillance, *MAPP Working Paper No. 12*. Aarhus: The Aarhus School of Business.
- Gussow, J. D. (1994). Ecology and vegetarian considerations: does environmental responsibility demand the elimination of livestock? *American Journal of Clinical Nutrition*, 59(suppl.), S1110-S1116.

- Gussow, J. D., & Akabas, S. (1993). Are we really fixing up the food supply? *Journal of the American Dietetic Association*, 93(11), 1300-1304.
- Gussow, J. D., & Contento, I. (1984). Nutrition education in a changing world. *World Review of Nutrition and Dietetics*, 44, 1-56.
- Hackman, E. M., & Moe, G. L. (1999). Evaluation of newspaper reports of nutrition-related research. *Journal of the American Dietetic Association*, 99(12), 1564-1566.
- Haddad, E. H., Sabaté, J., & Whitten, C. G. (1999). Vegetarian food guide pyramid: a conceptual framework. *American Journal of Clinical Nutrition*, 70(suppl.), S615-S619.
- Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1995). *Multivariate Data Analysis* (4th ed.). Eaglewood Cliffs, New Jersey: Prentice Hall.
- Hamilton, M., Waddington, P. A. J., Gregory, S., & Walker, A. (1995). Eat, drink and be saved: the spiritual significance of alternative diets. *Social Compass*, 42(4), 497-511.
- Hamilton, M. B. (1993). Wholefoods and healthfoods: beliefs and attitudes. *Appetite*, 20, 223-228.
- Harris, S. G. (1994). Organizational culture and individual sensemaking: a schema-based perspective. *Organization Science*, 5(3), 309-321.
- Hayes, D., & Ross, C. E. (1987). Concern with appearance, health beliefs, and eating habits. *Journal of Health and Social Behaviour*, 28, 120-130.
- Hebert, J. R., Clemow, L., Pbert, L., Ockene, I. S., & Ockene, J. K. (1995). Social desirability bias in dietary self-report may compromise the validity of dietary intake measures. *International Journal of Epidemiology*, 24(2), 389-398.
- Heesacker, M., Petty, R. E., & Cacioppo, J. T. (1983). Field dependence and attitude change: source credibility can alter persuasion by affecting message-relevant thinking. *Journal of Personality*, 51(4), 653-666.
- Heider, F. (1944). Social perception and phenomenal causality. *Psychological Review*, 51, 358-374.
- Helman, A. (1997). Nutrition and general practice: an Australian perspective. *American Journal of Clinical Nutrition*, 65(suppl.), S1939-S1942.
- Helman, A. D. (1988). Poster session abstracts. A comparison of attitudes towards nutrition of vegetarians, and orthodox and unorthodox health care providers. *American Journal of Clinical Nutrition*, 48, 924.
- Herbert, V. (1994). Staging vitamin-B12 (cobalamin) status in vegetarians. *American Journal of Clinical Nutrition*, 59(5), S1213-S1222.
- Herrera, M. (1992). Environmentalism and political participation: toward a new system of social beliefs and values? *Journal of Applied Social Psychology*, 22(8), 657-676.
- Hess, U., Flick, E.-M., & Oltersdorf, U. (1993). Consumer attitudes towards alternative diets. *Appetite*, 20, 219-222.
- Hiddink, G. J., Hautvast, J. G. A. J., van Woerkum, C. M. J., Fieren, C. J., & van't Hof, M. A. (1995). Nutrition guidance by primary-care physicians: perceived barriers and low involvement. *European Journal of Clinical Nutrition*, 49, 842-851.
- Hill, M. J. (1999). Meat and colo-rectal cancer. *Proceedings of the Nutrition Society*, 58, 261-264.
- Hojer, B. (1992). Socio-cognitive structures and television reception. *Media, Culture and Society*, 14, 583-603.

- Holm, L., & Møhl, M. (2000). The role of meat in everyday food culture; an analysis of an interview study in Copenhagen. *Appetite*, 34, 277-283.
- Horwath, C. C. (1989). Chewing difficulty and dietary intake in the elderly. *Journal of Nutrition for the Elderly*, 9(2), 17-24.
- Hunt, J. R. (1996). Bioavailability algorithms in setting recommended dietary allowances: lessons from iron, applications to zinc. *Journal of Nutrition*, 126(S9), S2345-S2353.
- Jabs, J., Devine, C. M., & Sobal, J. (1998a). Maintaining vegetarian diets: personal factors, social networks and environmental resources. *Canadian Journal of Dietetic Practice and Research*, 59(4), 183-189.
- Jabs, J., Devine, C. M., & Sobal, J. (1998b). Model of the process of adopting vegetarian diets: health vegetarians and ethical vegetarians. *Journal of Nutrition Education*, 30(4), 196-202.
- Jabs, J., Sobal, J., & Devine, C. M. (2000). Managing vegetarianism: identities, norms and interactions. *Ecology of Food and Nutrition*, 39, 375-394.
- James, A. (1993). Eating green(s): discourses of organic food. In K. Milton (Ed.), *Environmentalism: the view from anthropology* (pp. 205-218). London: Routledge.
- James, P. (1998). Food is a public health issue [news]. *British Medical Journal*, 316, 416.
- James, W. P. T. (1988). *Healthy Nutrition: preventing nutrition-related diseases in Europe*. WHO Regional Publications, European Series, No. 24. Copenhagen: World Health Organization, Regional Office for Europe.
- Janelle, K. C., & Barr, S. I. (1995). Nutrient intakes and eating behaviour scores of vegetarian and non-vegetarian women. *Journal of the American Dietetic Association*, 95(2), 180-189.
- Johnson, D. B., Eaton, D. L., Wahl, P. W., & Gleason, C. (2001). Public health nutrition practice in the United States. *Journal of the American Dietetic Association*, 101(5), 529-534.
- Joshiyura, K. J., Ascherio, A., Manson, J. E., Stampfer, M. J., Rimm, E. B., Speizer, F. E., Hennekens, C. H., Spiegelman, D., & Willett, W. C. (1999). Fruit and vegetable intake in relation to risk of ischemic stroke. *Journal of the American Medical Association*, 282, 1233-1239.
- Kalof, L., Dietz, T., Stern, P. C., & Guagnano, G. A. (1999). Social psychological and structural influences on vegetarian beliefs. *Rural Sociology*, 64(3), 500-511.
- Kandel, R. F., & Pelto, G. H. (1980). The health food movement: social revitalization or alternative health maintenance system? In N. W. Jerome & R. F. Kandel & G. H. Pelto (Eds.), *Nutritional Anthropology: contemporary approaches to diet and culture* (pp. 327-363). USA: Redgrave.
- Kassulke, D., Stenner-Day, K., Coory, M., & Ring, I. (1993). Information-seeking behaviour and sources of health information: associations with risk factor status in an analysis of three Queensland electorates. *Australian Journal of Public Health*, 17(1), 51-57.
- Kearney, M., Gibney, M. J., Martinez, J. A., de Almeida, M. D. V., Friebe, D., Zunft, H. J. F., Widhalm, K., & Kearney, J. M. (1997). Perceived need to alter eating habits among representative samples of adults from all member states of the European Union. *European Journal of Clinical Nutrition*, 51(suppl. 2), S30-S35.

- Kemmer, D., Anderson, A. S., & Marshall, D. W. (1998). Living together and eating together: changes in food choice and eating habits during the transition from single to married/cohabiting. *The Sociological Review*, 46(1), 48-72.
- Kennedy, E. T., Bowman, S. A., Spence, J. T., Freedman, M., & King, J. (2001). Popular diets: correlation to health, nutrition, and obesity. *Journal of the American Dietetic Association*, 101(4), 411-420.
- Kenyon, P. M., & Barker, M. E. (1998). Attitudes towards meat-eating in vegetarian and non-vegetarian girls in England - an ethnographic approach. *Appetite*, 30, 185-198.
- Key, T. J., Davey, G. K., & Appleby, P. N. (1999). Health benefits of a vegetarian diet. *Proceedings of the Nutrition Society*, 58, 271-275.
- Key, T. J., Fraser, G. E., Thorogood, M., Appleby, P. N., Beral, V., Reeves, G., Burr, M. L., Chang-Claude, J., Frentzel-Beyme, R., Kuzma, J. W., Mann, J., & McPherson, K. (1998). Mortality in vegetarians and non-vegetarians: a collaborative analysis of 8300 deaths among 76,000 men and women in five prospective studies. *Public Health Nutrition*, 1(1), 33-41.
- Key, T. J., Fraser, G. E., Thorogood, M., Appleby, P. N., Beral, V., Reeves, G., Burr, M. L., Chang-Claude, J., Frentzel-Beyme, R., Kuzma, J. W., Mann, J., & McPherson, K. (1999). Mortality in vegetarians and nonvegetarians: detailed findings from a collaborative analysis of 5 prospective studies. *American Journal of Clinical Nutrition*, 70(suppl.), S516-S524.
- Key, T. J., Thorogood, M., Appleby, P. M., & Burr, M. L. (1996). Dietary habits and mortality in 11,000 vegetarians and health conscious people: results of a 17 year follow up. *British Medical Journal*, 313, 775-779.
- Kim, E. H. J., Schroeder, K. M., Houser, R. F., & Dwyer, J. T. (1999). Two small surveys, 25 years apart, investigating motivations of dietary choice in 2 groups of vegetarians in the Boston area. *Journal of the American Dietetic Association*, 99(5), 598-601.
- Klapp, O. E. (1978). *Opening and Closing: strategies of information adaptation in society*. Cambridge: Cambridge University Press.
- Knutsen, S. F. (1994). Lifestyle and the use of health services. *American Journal of Clinical Nutrition*, 59(suppl.), S1171-S1175.
- Koc, M., MacRae, R., Mougeot, L. J. A., & Welsh, J. (1999). Introduction: food security is a global concern. In M. Koc & R. MacRae & L. J. A. Mougeot & J. Welsh (Eds.), *For Hunger-proof Cities: sustainable urban food systems* (pp. 1-7). Ottawa: International Development Research Centre.
- Krause, D. (1993). Environmental consciousness: an empirical study. *Environment and Behaviour*, 25(1), 126-142.
- Kristiansen, C. M. (1990). The role of values in the relation between gender and health behaviour. *Social Behaviour*, 5, 127-133.
- Kunkel, M. E., Cody, M. M., Davis, R. J., & Wheeler, F. C. (1986). Nutrition information sources used by South Carolina adults. *Journal of the American Dietetic Association*, 86(3), 371-372.
- Lacey, R. (1992). Scares and the British food system: problems and policies in relation to food-related health issues. *British Food Journal*, 94(7), 26-30.
- Laforge, R. G., Greene, G. W., & Prochaska, J. O. (1994). Psychosocial factors influencing low fruit and vegetable consumption. *Journal of Behavioral Medicine*, 17(4), 361-374.
- Lambert-Lagace, L. (1983). Media, nutrition information and consumer reactions. *Journal of Nutrition Education*, 15(1), 6-7.

- Lang, T. (1998). Food policy: time to change course? *RSA Journal*, 145(5484 1/4), 109-118.
- Lang, T. (1999a). Food as a public health issue. In S. Griffiths & D. J. Hunter (Eds.), *Perspectives in Public Health* (pp. 47-58). Oxon: Radcliffe Medical Press.
- Lang, T. (1999b). Food policy for the 21st century: can it be both radical and reasonable? In M. Koc & R. MacRae & L. J. A. Mougeot & J. Welsh (Eds.), *For Hunger-proof Cities: sustainable urban food systems* (pp. 216-224). Ottawa: International Development Research Centre.
- Lang, T. (1999c). Towards a sustainable food policy. In G. Tansey & J. D'Silva (Eds.), *The Meat Business: devouring a hungry planet* (pp. 120-135). New York: St. Martin's Press.
- Lappalainen, R., Saba, A., Holm, L., Mykkanen, H., & Gibney, M. J. (1997). Difficulties in trying to eat healthier: descriptive analysis of perceived barriers for healthy eating. *European Journal of Clinical Nutrition*, 51(suppl. 2), S36-S40.
- Lawrence, G., Lyons, K., & Lockie, S. (1999). Healthy for you, healthy for the environment: corporate capital, farming practice and the construction of 'green' foods. *Rural Society*, 9(3), 543-553.
- Lawrence, V. (1993). Is vegetarianism a diet or an ideology? *Canadian Medical Association Journal*, 148(6), 998-1002.
- Lazarus, K. (1997). Nutrition practices of family physicians after education by a physician nutrition specialist. *American Journal of Clinical Nutrition*, 65(suppl.), S2007-S2009.
- Leckie, S. (1999). How meat-centred eating patterns affect food security and the environment. In M. Koc & R. MacRae & L. J. A. Mougeot & J. Welsh (Eds.), *For Hunger-proof Cities: sustainable urban food systems* (pp. 145-149). Ottawa: International Development Research Centre.
- Lefebvre, R. C., Lurie, D., Saunders Goodman, L., Weinberg, L., & Loughrey, K. (1995). Social marketing and nutrition education: inappropriate or misunderstood? *Journal of Nutrition Education*, 27(3), 146-150.
- Leneman, L. (1997). The awakened instinct: vegetarianism and the women's suffrage movement in Britain. *Women's History Review*, 6(2), 271-287.
- Lennernas, M., Fjellstrom, C., Becker, W., Giachetti, I., Schmitt, A., Remaut de Winter, A. M., & Kearney, M. (1997). Influences on food choice perceived to be important by nationally-representative samples of adults in the European Union. *European Journal of Clinical Nutrition*, 51(2), S8-S15.
- Lester, I. H. (1994). *Australia's Food and Nutrition*. Canberra: Government Publishing Service.
- Lewis, C. J., Sims, L. S., & Shannon, B. (1989). Examination of specific nutrition/health behaviours using a social cognitive model. *Journal of the American Dietetic Association*, 89(2), 194-202.
- Lewis, S. (1994). An opinion on the global impact of meat consumption. *American Journal of Clinical Nutrition*, 59(suppl.), S1099-S1102.
- Li, D., Sinclair, A., Mann, N., Turner, A., Ball, M., Kelly, F., Abedin, L., & Wilson, A. (1999). The association of diet and thrombotic risk factors in healthy male vegetarians and meat-eaters. *European Journal of Clinical Nutrition*, 53(8), 612-619.
- Liberman, A., & Chaiken, S. (1992). Defensive processing of personally relevant health messages. *Personality and Social Psychology Bulletin*, 18(6), 669-679.

- Lindeman, M., Keski-Vaara, P., & Roschier, M. (2000). Assessment of magical beliefs about food and health. *Journal of Health Psychology, 5*(2), 195-209.
- Lindeman, M., & Stark, K. (1999). Pleasure, pursuit of health or negotiation of identity? Personality correlates of food choice motives among young and middle-aged women. *Appetite, 33*, 141-161.
- Ling, A. M. C., & Horwath, C. (2000). Defining and measuring stages of change for dietary behaviors: readiness to meet fruit, vegetables and grains guidelines among Chinese Singaporeans. *Journal of the American Dietetic Association, 100*, 898-904.
- Lloyd, H. M., Paisley, C. M., & Mela, D. J. (1995). Barriers to the adoption of reduced-fat diets in a UK population. *Journal of the American Dietetic Association, 95*(3), 316-322.
- Locker, D., Clarke, M., & Payne, B. (2000). Self-perceived oral health status, psychological well-being, and life satisfaction in an older adult population. *Journal of Dental Research, 79*(4), 970-975.
- Lockie, S., Lyons, K., Lawrence, G., & Mummery, K. (2001). *Eating 'green': the relative importance of environmental concerns in the consumption of organic foods in Australia*. Paper presented at the Kyoto Environmental Sociology Conference, Kyoto.
- Looker, A., & Shannon, B. (1984). Threat vs. benefit appeals: effectiveness in adult nutrition education. *Journal of Nutrition Education, 16*(4), 173-176.
- Lyons, K. (1999). Corporate environmentalism and organic agriculture in Australia: the case of Uncle Tobys. *Rural Sociology, 64*(2), 251-265.
- MacLaren, T. (1997). Messages for the masses: food and nutrition issues on television. *Journal of the American Dietetic Association, 97*(7), 733-734.
- Maibach, E., & Holtgrave, D. R. (1995). Advances in public health communication. *Annual Review of Public Health, 16*, 219-238.
- Mann, J. I. (2000). Optimizing the plant-based diet. *Asia Pacific Journal of Clinical Nutrition, 9*(suppl. 1), S60-S64.
- Margetts, B. M., Martinez, J. A., Saba, A., Holm, L., & Kearney, M. (1997). Definitions of 'healthy' eating; a pan-EU survey of consumer attitudes to food, nutrition and health. *European Journal of Clinical Nutrition, 51*(suppl. 2), S23-S29.
- Markus, H., Hamill, R., & Sentis, K. P. (1987). Thinking fat: self-schemas for body weight and the processing of weight relevant information. *Journal of Applied Social Psychology, 17*(1), 50-71.
- McDonnell, G. E., Roberts, D. C. K., & Lee, C. (1998). Stages of change and reduction of dietary fat: effect of knowledge and attitudes in an Australian university population. *Journal of Nutrition Education, 30*, 37-44.
- McGinnies, E. (1968). Studies in persuasion: IV. Source credibility and involvement as factors in persuasion with students in Taiwan. *The Journal of Social Psychology, 74*, 171-180.
- McGuire, W. J. (1969). The nature of attitudes and attitude change. In G. Lindzey & E. Aronson (Eds.), *The Handbook of Social Psychology* (2nd ed., Vol. 3, pp. 136-314). Reading, Massachusetts: Addison-Wesley Publishing Company.
- McIntosh, W. A., Fletcher, R. D., Kubena, K. S., & Landmann, W. A. (1995). Factors associated with sources of influence/information in reducing red meat by elderly subjects. *Appetite, 24*, 219-230.

- McIntosh, W. A., & Guseman, P. K. (1985). *Sociological models of fruit and vegetable consumption*. Paper presented at the Annual Meeting of the Southern Association of Agricultural Scientists, Biloxi, Mississippi.
- McIntosh, W. A., Kubena, K., & Usery, C. (n.d.). Mass media influences on efforts to reduce dietary fat. Department of Rural Sociology, Texas A&M University: unpublished manuscript.
- McIntosh, W. A., Kubena, K. S., Jiang, H., Usery, C. P., & Karnei, K. (1996). An application of the Health Belief Model to reductions in fat and cholesterol intake. *Journal of Wellness Perspectives*, 12(2), 98-107.
- McNutt, K. (1990). Integrating nutrition and environmental objectives. *Nutrition Today*, 25(6), 40-41.
- Meat and Livestock Australia. (2001). *The Role of Red Meat in Healthy Australian Diets. Final Report* Sydney: Meat and Livestock Australia.
- Mennell, S. (1985). *All Manners of Food: eating and taste in England and France from the Middle Ages to the present*. Oxford: Basil Blackwell.
- Mertig, A. G., & Dunlap, R. E. (1995). Public approval of environmental protection and other new social movement goals in Western Europe and the United States. *International Journal of Public Opinion Research*, 7(2), 145-156.
- Mertig, A. G., & Dunlap, R. E. (2001). Environmentalism, new social movements, and the new class: a cross-national investigation. *Rural Sociology*, 66(1), 113-136.
- Messer, E. (1984). Anthropological perspectives on diet. *Annual Review of Anthropology*, 13, 205-249.
- Miele, M. (1999). Short circuits: new trends in the consumption of food and the changing status of meat. *International Planning Studies*, 4(3), 373-387.
- Milio, N. (1990). Towards healthy public policy in food and nutrition. *Public Health*, 104, 45-54.
- Milio, N. (2001). The internet, public health, and the globalisation of just about everything. *Journal of Epidemiology and Community Health*, 55, 74-76.
- Mintz, S. W. (1985). *Sweetness and Power: the place of sugar in modern history*. New York: Penguin Books.
- Monk, A. (1999). The organic manifesto: organic agriculture in the world food system. In D. Burch & J. Goss & G. Lawrence (Eds.), *Restructuring Global and Regional Agricultures: transformations in Australasian agri-food economies and spaces* (pp. 75-86). Aldershot: Ashgate.
- National Health and Medical Research Council. (1992). *Dietary Guidelines for Australians*. Canberra: AGPS.
- National Health and Medical Research Council. (2001). *Dietary Guidelines for Australians [draft]*. National Health and Medical Research Council. Available: <http://www.nhmrc.gov.au/advice/diet.htm> [2001, August 15].
- Neale, R. J., Tilston, C. H., Gregson, K., & Stagg, T. (1993). Women vegetarians: lifestyle considerations and attitudes to vegetarianism. *Nutrition and Food Science*, no. 1, January/February, 24-27.
- Nestle, M. (1998). Toward more healthful dietary patterns - A matter of policy. *Public Health Reports*, 113(5), 420-423.
- Nestle, M., Wing, R., Birch, L., DiSogra, L., Drewnowski, A., Middleton, S., Sigman-Grant, M., Sobal, J., Winston, M., & Economos, C. (1998). Behavioral and social influences on food choice. *Nutrition Reviews*, 56(5), S50-S74.

- Nicklas, T. A., Farris, R. P., Myers, L., & Berenson, G. S. (1995). Impact of meat consumption on nutritional quality and cardiovascular risk factors in young adults: The Bogalusa Heart Study. *Journal of the American Dietetic Association*, 95, 887-892.
- Norman, P., & Conner, M. (1996). The role of social cognition models in predicting health behaviours: future directions. In M. Conner & P. Norman (Eds.), *Predicting Health Behaviour: research and practice with social cognition models* (pp. 197-225). Buckingham: Open University Press.
- Novascone, M. A., & Hertzler, A. A. (1986). Perception of nutrient density and information links of college students. *Journal of the American Dietetic Association*, 86(1), 94-95.
- O'Keefe, G. J., Hartwig Boyd, H., & Brown, M. R. (1998). Who learns preventive health care information from where: cross-channel and repertoire comparisons. *Health Communication*, 10(1), 25-36.
- Olson, J. M., & Zanna, M. P. (1993). Attitudes and attitude change. *Annual Review of Psychology*, 44, 117-154.
- Ouédraogo, A. P. (1999). The social genesis of western vegetarianism to 1859. In R. Dare (Ed.), *Food, Power and Community*. Adelaide: Wakefield Press.
- Ôunpuu, S., Woolcott, D. M., & Greene, G. W. (2000). Defining stage of change for lower-fat eating. *Journal of the American Dietetic Association*, 100, 674-679.
- Parmenter, K., Waller, J., & Wardle, J. (2000). Demographic variation in nutrition knowledge in England. *Health Education Research*, 15(2), 163.
- Petty, R. E., & Cacioppo, J. T. (1986). *Communication and Persuasion: central and peripheral routes to attitude change*. New York: Springer-Verlag.
- Phillips, C. V. (1999). Complex systems model of dietary choice with implications for improving diets and promoting vegetarianism. *American Journal of Clinical Nutrition*, 70(suppl.), S608-S614.
- Pimentel, D., Houser, J., Preiss, E., & White, O. (1997). Water resources: agriculture, the environment, and society. *BioScience*, 47(2), 97-106.
- Pimentel, D., & Pimentel, M. (1979). *Food, Energy and Society*. London: Edward Arnold.
- Pimentel, D., & Pimentel, M. (1996). *Food, Energy and Society*. Niwot, CO: University Press of Colorado.
- Pollay, R. W. (1987). On the value of reflections on the values in "The distorted mirror". *Journal of Marketing*, 51, 104-109.
- Pollay, R. W., & Gallagher, K. (1990). Advertising and cultural values: reflections in the distorted mirror. *International Journal of Advertising*, 9, 359-372.
- Potter, J. D. (2000). Your mother was right: eat your vegetables. *Asia Pacific Journal of Clinical Nutrition*, 9(suppl. 1), S10-S12.
- Povey, R., Wellens, B., & Conner, M. (2001). Attitudes towards following meat, vegetarian and vegan diets: an examination of the role of ambivalence. *Appetite*, 37, 15-26.
- Prochaska, J. O., DiClemente, C. C., & Norcross, J. C. (1992). In search of how people change: applications to addictive behaviors. *American Psychologist*, 47(9), 1102-1114.
- Prochaska, J. O., Velicer, W. F., Rossi, J. S., Goldstein, M. G., Marcus, B. H., Rakowski, W., Fiore, C., Harlow, L. L., Redding, C. A., Rosenbloom, D., & Rossi, S. R. (1994). Stages of change and decisional balance for 12 problem behaviors. *Health Psychology*, 13(1), 39-46.

- Quandt, S. A., Vitolins, M. Z., DeWalt, K. M., & Roos, G. M. (1997). Meal patterns of older adults in rural communities: life course analysis and implications for undernutrition. *Journal of Applied Gerontology*, 16(2), 152-171.
- Radimer, K. L., & Harvey, P. W. J. (1995). Where do Queenslanders get nutrition information? *Australian Journal of Nutrition and Dietetics*, 52(2), 94-99.
- Rakowski, W., Assaf, A. R., Lefebvre, R. C., Lasater, T. M., Niknian, M., & Carleton, R. A. (1990). Information-seeking about health in a community sample of adults: correlates and associations with other health-related practices. *Health Education Quarterly*, 17(4), 379-393.
- Rappoport, L., Peters, G., Downey, R., McCann, T., & Huff-Corzine, L. (1993). Gender and age differences in food cognition. *Appetite*, 20, 33-52.
- Reger, B., Wootan, M. G., & Booth-Butterfield, S. (1999). Using mass media to promote healthy eating: a community-based demonstration project. *Preventive Medicine*, 29, 414-421.
- Register, U., & Sonnenberg, L. (1973). The vegetarian diet. *Journal of the American Dietetic Association*, 62, 253-261.
- Reilly, C. (1985). Nutrition attitudes and beliefs of the community as reflected in the Queensland press. *Food Technology in Australia*, 37(12), 559-567.
- Reilly, C., Yann, M., & Cumming, F. (1987). Nutrition education and women's magazines in Australia. *Food Technology in Australia*, 39(3), 96-101.
- Richardson, K. M., Cheung, S., Wahlqvist, M. L., & Hsu-Hage, B. (1998). Nutrition information and consumer needs: a pilot study. *Proceedings of the Nutrition Society of Australia*, 22, 279.
- Richardson, N. J. (1994). UK consumer perceptions of meat. *Proceedings of the Nutrition Society*, 53, 281-287.
- Richardson, N. J., MacFie, H. J. H., & Shepherd, R. (1994). Consumer attitudes to meat eating. *Meat Science*, 36, 57-65.
- Richardson, N. J., Shepherd, R., & Elliman, N. (1994). Meat consumption, definition of meat and trust in information sources in the UK population and members of The Vegetarian Society. *Ecology of Food and Nutrition*, 33, 1-13.
- Richardson, N. J., Shepherd, R., & Elliman, N. A. (1993). Current attitudes and future influences on meat consumption in the UK. *Appetite*, 21, 41-51.
- Rogers, E. M. (1983). *Diffusion of Innovations* (3rd ed.). New York: The Free Press.
- Rokeach, M. (1973). *The Nature of Human Values*. New York: Free Press.
- Roos, G., Prättälä, R., & Koski, K. (2001). Men, masculinity and food: interviews with Finnish carpenters and engineers. *Appetite*, 37, 47-56.
- Rosegrant, M. W., Leach, N., & Gerpacio, R. V. (1999). Alternative futures for world cereal and meat consumption. *Proceedings of the Nutrition Society*, 58, 219-234.
- Rosenstock, I. M. (1974). Historical origins of the Health Belief Model. *Health Education Monographs*, 2(4), 328-335.
- Rosenstock, I. M. (1990). The Health Belief Model: explaining health behaviour through expectancies. In K. Glanz & F. M. Lewis & B. K. Rimer (Eds.), *Health Behaviour and Health Education: theory, research and practice* (pp. 39-62). San Francisco: Jossey-Bass Inc.
- Rozin, P. (1997). Moralization. In A. M. Brandt & P. Rozin (Eds.), *Morality and Health* (pp. 379-401). New York: Routledge.
- Rozin, P., Haidt, J., & McCauley, C. R. (1993). Disgust. In M. Lewis & J. M. Haviland (Eds.), *Handbook of Emotions* (pp. 575-594). New York: The Guilford Press.

- Rozin, P., Markwith, M., & Stoess, C. (1997). Moralization and becoming a vegetarian: the transformation of preferences into values and the recruitment of disgust. *Psychological Science*, 8(2), 67-73.
- Russell, R. M. (2001). Factors in aging that effect the bioavailability of nutrients. *Journal of Nutrition*, 131(4S), S1359-S1361.
- Sadalla, E., & Burroughs, J. (1981). Profiles in eating: sexy vegetarians and other diet based social stereotypes. *Psychology Today*, 16(10), 51 -57.
- Sanders, T. A. B. (1999). The nutritional adequacy of plant-based diets. *Proceedings of the Nutrition Society*, 58, 265-269.
- Sanders, T. A. B., & Reddy, S. (1994). Nutritional implications of a meatless diet. *Proceedings of the Nutrition Society*, 53, 297-307.
- Santich, B. (1996). *A brief history of food choice in Australia*. Paper presented at the Multidisciplinary Approaches to Food Choice: Food Choice Conference, Adelaide, Australia.
- Santos, M. L. S., & Booth, D. A. (1996). Influences on meat avoidance among British students. *Appetite*, 27, 197-205.
- Sapp, S. G. (1991). Impact of nutritional knowledge within an expanded rational expectations model of beef consumption. *Journal of Nutrition Education*, 23(5), 214-222.
- Sapp, S. G., & Harrod, W. J. (1989). Social acceptability and intentions to eat beef: an expansion of the Fishbein-Ajzen model using reference group theory. *Rural Sociology*, 54(3), 420-438.
- Schoenberg, N. E., & Gilbert, G. H. (1998). Dietary implications of oral health decrements among African-American and White older adults. *Ethnicity and Health*, 3(1/2), 59-70.
- Schwartz, S. H. (1992). Universals in the content and structure of values: theoretical advances and empirical tests in 20 countries. *Advances in Experimental Social Psychology*, 25, 1-65.
- Schwartz, S. H., & Inbar-Saban, N. (1988). Values self-confrontation as a method to aid in weight loss. *Journal of Personality and Social Psychology*, 54(3), 396-404.
- Schwarz, N. (1999). Self-reports: how the questions shape the answers. *American Psychologist*, 54(2), 93-105.
- Severin, W. J., & Tankard, J. W. (1992). *Communication Theories: origins, methods and uses in the mass media* (3rd ed.). New York: Longman.
- Shatenstein, B., Kergoat, M., & Nadon, S. (2001). Weight change, nutritional risk and its determinants among cognitively intact and demented elderly Canadians. *Canadian Journal of Public Health*, 92(2), 143-149.
- Shepherd, R., & Sparks, P. (1994). Modelling food choice. In H. J. H. MacFie & D. M. H. Thomson (Eds.), *Measurement of Food Preferences* (pp. 202-226). Glasgow: Blackie Academic and Professional.
- Shepherd, R., & Stockley, L. (1987). Nutrition knowledge, attitudes, and fat consumption. *Journal of the American Dietetic Association*, 87(5), 615-619.
- Silvester, K., & Horwath, C. (1991). The nutrition information sources of elderly New Zealanders. *Journal of Nutrition for the Elderly*, 1(1), 45 -53.
- Simon, H. A. (1990). Invariants of human behavior. *Annual Review of Psychology*, 41, 1-19.
- Simon, M. (1998). *Sci-Veg: convincing people*, [Internet - e-mail and personal communication]. Available: <http://www.waste.org/sci-veg> [1998, March 26].

- Sims, L. S. (1978). Food-related value-orientations, attitudes and beliefs of vegetarians and non-vegetarians. *Ecology of Food and Nutrition*, 7, 23-35.
- Singer, P. (1990). *Animal Liberation* (2nd ed.). London: Thorsons.
- Slattery, M. L., Jacobs, D. R., Hilner, J. E., Caan, B. J., Van Horn, L., Bragg, C., Manolio, T. A., Kushi, L. H., & Liu, K. (1991). Meat consumption and its association with other diet and health factors in young adults: the CARDIA Study. *American Journal of Clinical Nutrition*, 54, 930-935.
- Snow, C. F. (1999). Laboratory diagnosis of vitamin B12 and folate deficiency: a guide for the primary care physician. *Archives of Internal Medicine*, 159(12), 1289-1298.
- Sparks, P., Guthrie, C. A., & Shepherd, R. (1997). The dimensional structure of the perceived behavioral control construct. *Journal of Applied Social Psychology*, 27(5), 418-438.
- Spedding, C. R. W. (1990). The effect of dietary changes on agriculture. In B. Lewis & G. Assmann (Eds.), *The Social and Economic Contexts of Coronary Prevention*. London: Current Medical Literature.
- Spencer, C. (1993). *The Heretic's Feast: a history of vegetarianism*. London: Fourth Estate.
- Spezzano, D. (1999). Organics - a fad or a trend? *Supermarket Business*, 5(2), 85.
- SPSS. (1990). *SPSS Categories*. Chicago: SPSS.
- Stahl, P. (2000). Status report on nutrition in the news. *Journal of the American Dietetic Association*, 100(11), 1298-1299.
- Stiles, B. L. (1998). Vegetarianism: identity and experiences as factors in food selection. *Free Enquiry in Creative Sociology*, 26(2), 213-225.
- Strandhagen, E., Hansson, P. O., Bosaeus, I., Isaksson, B., & Eriksson, H. (2000). High fruit intake may reduce mortality among middle-aged and elderly men. The Study of Men Born in 1913. *European Journal of Clinical Nutrition*, 54, 337-341.
- Sussman, V. (1978). *The Vegetarian Alternative: a guide to a healthful and humane diet*. Emmaus, PA: Rodale Press.
- Sutton, S. M., Balch, G. I., & Lefebvre, R. C. (1995). Strategic questions for consumer-based health communications. *Public Health Reports*, 110, 725-733.
- ter Hofstede, F., Steenkamp, J-B. E. M., & Wedel, M. (1999). International market segmentation based on consumer-product relations. *Journal of Marketing Research*, 36, 1-17.
- Thomas, H. V., Davey, G. K., & Key, T. J. (1999). Oestradiol and sex hormone-binding globulin in premenopausal and post-menopausal meat-eaters, vegetarians and vegans. *British Journal of Cancer*, 80(9), 1470-1475.
- Thorogood, M., Mann, J., Appleby, P., & McPherson, K. (1994). Risk of death from cancer and ischaemic heart disease in meat and non-meat eaters. *British Medical Journal*, 308, 1667-1670.
- Timperio, A., Cameron-Smith, D., Burns, C., & Crawford, D. (2000). The public's response to the obesity epidemic in Australia: weight concerns and weight control practices of men and women. *Public Health Nutrition*, 3(4), 417-424.
- Tuorila-Ollikainen, H. (1987). Selection of milks with varying fat contents and related overall liking, attitudes, norms and intentions. *Appetite*, 8(1), 1-14.
- Tuorila-Ollikainen, H., Lahteenmaki, L., & Salovaara, H. (1986). Attitudes, norms, intentions and hedonic responses in the selection of low salt bread in a longitudinal choice experiment. *Appetite*, 7, 127-139.
- Twigg, J. (1979). Food for thought: purity and vegetarianism. *Religion*, 9, 13-35.

- Twigg, J. (1983). Vegetarianism and the meanings of meat. In A. Murcott (Ed.), *The Sociology of Food and Eating: essays on the social significance of food* (pp. 18-30). Aldershot, England: Gower.
- US Department of Health and Human Services. (2000). Healthy People 2010 - Conference Edition. Washington: US Department of Health and Human Services.
- Uvin, P. (1994). The state of world hunger. In P. Uvin (Ed.), *The Hunger Report 1993* (pp. 1-42). Langhorne, Pa: Gordon and Breach for the Alan Shawn Feinstein World Hunger Program, Brown University.
- Uyeki, E. S., & Holland, L. J. (2000). Diffusion of pro-environment attitudes? *American Behavioral Scientist*, 43(4), 646-662.
- Vaandrager, H. W., & Koelen, M. A. (1997). Consumer involvement in nutritional issues: the role of information. *American Journal of Clinical Nutrition*, 65(suppl.), S1980-S1984.
- van't Veer, P., Jansen, M. C. J. F., Klerk, M., & Kok, F. J. (2000). Fruits and vegetables in the prevention of cancer and cardiovascular disease. *Public Health Nutrition*, 3(1), 103-107.
- Variyam, J. N., Blaylock, J., & Smallwood, D. M. (1996). Modelling nutrition knowledge, attitudes, and diet-disease awareness: the case of dietary fibre. *Statistics in Medicine*, 15(1), 23-35.
- Vegetarian Resource Group. (1999). *How many people order vegetarian meals when eating out? A 1999 Zogby International poll*. Available: <http://www.vrg.org> [2000, April 3].
- Vegetarian Resource Group. (2000). *How many vegetarians are there? A 2000 National Zogby poll*. Available: <http://www.vrg.org> [2000, March 31].
- Vegetarian Society UK. (1991). Trends in vegetarianism among adults and young people. Altrincham: Vegetarian Society.
- Vegetarian Society UK. (n.d.). *Summary of RealEat polls 1984-1999*. Available: <http://www.vegsoc.org/info/realeat.html> [2001, April 9].
- Vollset, S. E., & Lande, B. (2000). Knowledge and attitudes of folate and use of dietary supplements among women of reproductive age in Norway in 1998. *Acta Obstetrica et Gynecologica Scandinavica*, 79(6), 513-519.
- Wahlqvist, M. L., Savige, G. S., & Lukito, W. (1995). Nutritional disorders in the elderly. *Medical Journal of Australia*, 163(7), 376-381.
- Walter, P. (1997). Effects of vegetarian diets on aging and longevity. *Nutrition Reviews*, 55(1), S61-S68.
- Warde, A., & Hetherington, K. (1994). English households and routine food practices: a research note. *The Sociological Review*, 42(4), 758-778.
- Webster, A. J. F. (1994). Meat and right: the ethical dilemma. *Proceedings of the Nutrition Society*, 53, 263-270.
- Weenig, M. W. H., & Midden, C. J. H. (1997). Mass-media information campaigns and knowledge-gap effects. *Journal of Applied Social Psychology*, 27(11), 945-958.
- White, R., & Frank, E. (1994). Health effects and prevalence of vegetarianism. *Western Journal of Medicine*, 160, 465-471.
- Whorton, J. C. (1994). Historical development of vegetarianism. *American Journal of Clinical Nutrition*, 59(suppl.), S1103-S1109.
- Wing, R. R., Jeffery, R. W., Burton, L. R., Thorson, C., Sperber Nissinoff, K., & Baxter, J. E. (1996). Food provision vs structured meal plans in the behavioral treatment of obesity. *International Journal of Obesity*, 20, 56-62.

- Wolinsky, F. D. (1980). *The Sociology of Health: principles, professions and issues*. Boston: Little/Brown.
- World Cancer Research Fund, & American Institute for Cancer Research. (1997). *Food, Nutrition and the Prevention of Cancer: a global perspective*. Washington DC: American Institute for Cancer Research.
- Worsley, A. (1988a). Australians' dietary and nutritional concerns. In A. S. Truswell & M. L. Wahlqvist (Eds.), *Food Habits in Australia* (pp. 122-145). Victoria: Rene Godon.
- Worsley, A. (1988b). Cohabitation-gender effects on food consumption. *International Journal of Biosocial Research*, 10(2), 107-122.
- Worsley, A. (1989). Perceived reliability of sources of health information. *Health Education Research*, 4(3), 367-376.
- Worsley, A., Baghurst, K., & Skrzypiec, G. (1995). *Meat Consumption and Young People*. Adelaide: CSIRO Final Report to the Meat Research Corporation.
- Worsley, A., Baghurst, K. I., Skrzypiec, G. K., & Powis, G. (1993). *Meat Consumption and Young People*. Adelaide: CSIRO Report to the Meat Research Corporation.
- Worsley, A., & Crawford, D. (1985a). Awareness and compliance with the Australian Dietary Guidelines: a study of Melbourne residents. *Nutrition Research*, 5, 1291-1308.
- Worsley, A., & Crawford, D. (1985b). Who complies with the Australian Dietary Guidelines? *Nutrition Research*, 6, 29-34.
- Worsley, A., & Murphy, S. (1994). Attitudes to food and nutrition policy from five different sectors in Australia. *Health Promotion International*, 9(4), 231-240.
- Worsley, A., & Scott, V. (2000). Consumers' concerns about food and health in Australia and New Zealand. *Asia Pacific Journal of Clinical Nutrition*, 9(1), 24-32.
- Worsley, A., & Skrzypiec, G. (1997). Teenagers' social attitudes and red meat consumption. In The Royal Society of New Zealand (Ed.), *Meat and Human Health* (pp. 10-15). Wellington, New Zealand: The Royal Society of New Zealand.
- Worsley, A., & Skrzypiec, G. (1998a). Do attitudes predict red meat consumption among young people? *Ecology of Food and Nutrition*, 37, 163-195.
- Worsley, A., & Skrzypiec, G. (1998b). Personal predictors of consumers' food and health concerns. *Asia-Pacific Journal of Clinical Nutrition*, 7, 15-23.
- Worsley, A., & Worsley, A. (1991). What should you eat? A survey of South Australian women's food consumption norms. *Appetite*, 16, 239-247.
- Worsley, A., & Worsley, A. J. (1989). The performance of domestic tasks - a survey of South Australian women. *Journal of the Home Economics Association of Australia*, 21, 37-39.
- Worsley, A., & Worsley, A. J. (1991). New Zealand general practitioners' nutrition opinions. *American Journal of Nutrition and Dietetics*, 48(1), 7-10.
- Wright, C. R. (1959). *Mass Communication: a sociological perspective*. New York: Random House.
- Yeaton, W. H., Smith, D., & Rogers, K. (1990). Evaluating understanding of popular press reports of health research. *Health Education Quarterly*, 17(2), 223-234.
- Zey, M., & McIntosh, W. A. (1992). Predicting intent to consume beef: normative versus attitudinal influences. *Rural Sociology*, 57(2), 250-265.

Zunft, H. J. F., Friebe, D., Seppelt, B., de Graaf, C., Margetts, B., Schmitt, A., & Gibney, M. J. (1997). Perceived benefits of healthy eating among a nationally-representative sample of adults in the European Union. *European Journal of Clinical Nutrition*, 51(suppl. 2), S41-S46.