

## Meat, Meat eating and Vegetarianism A Review of the Facts

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### Summary

This review focuses on modern attitudes towards meat, meat-eating and vegetarianism. It is contended that vegetarian attitudes are deep-rooted in society and that by examining those attitudes one can gain an insight into the reasons for the growing trend towards vegetarianism and for reduced meat eating amongst meat eaters. In the 1960s and 70s vegetarianism was closely linked with spiritual, devotional and ecological attitudes. This changed during the 1980s and 90s and concerns about animal welfare predominated. These concerns exist among adults and adolescents. For many adolescents the adoption of vegetarianism is a way of managing the anxiety or guilt that occurs with the realisation how animals are used by society. In urban society, the notion that animals are exploited for food is becoming less acceptable. The negative images of exploiting animals and of killing them for meat might be less common if schoolchildren were introduced at an early age to the fact that animals are raised to produce food. Besides animal welfare, vegetarianism is concerned with purity and spirituality, and a central theme is mental and physical harmony. This invokes a number of other beliefs and attitudes which in turn contribute to the decision not to eat meat. These attitudes include concern for one's own mental and physical health and concern for the environment. To understand the reasons behind the trend towards reduced meat eating one has to understand the accompanying attitudes.

Meat is simultaneously the most exalted and the most pernicious food that we have. Intensive meat production systems are castigated by polarised views about inhumanity to animals, commodity surpluses and waste, pollution of land, air and water and even global warming. Behind all these opinions is the impression that meat and meat production is acquiring an "unnatural" image. Unease about animal welfare is particularly strong amongst female semivegetarians and vegetarians. However, it is not restricted to this group; over one third of non-vegetarian young women also share this concern. Their attitudes to animal welfare are discussed in this review along with the health, body image and negative taste features that are linked to meat-eating. The information is presented in a way which allows a better appreciation of the outlooks and beliefs behind reduced meat eating.

### Introduction

Vegetarians represent only a small section of the community who refrain from eating meat or eat little meat. By studying their attitudes we can identify some of the key features which lead to more generalised reduced meat eating. This review examines attitudes and beliefs along with those of young semivegetarians. It is thought that the attitudes and beliefs amongst young semivegetarians could be important in influencing whether reduced meat eating increases in the future.

Vegetarian concepts may also be contributing towards the beliefs about meat amongst meat-eaters. In many cases the trend away from meat eating is occurring without the individuals becoming vegetarian, but they are following some of the beliefs of the vegetarian and semivegetarian movement. In the first parts of the review the innate cultural attitudes and beliefs about meat are examined. This leads into recent changes in attitudes and then into the reasons for vegetarianism and semivegetarianism.

The various terms used to describe vegetarianism are as follows:

<i>Veganism</i> -	excludes the consumption of all food of animal origin except human breast milk.
<i>Rastafarian veganism</i> -	in general the diet excludes all red meat, milk, fats and oils of animal origin, but it may include fish depending on the nationality of the Rastafarian.
<i>Macrobiotic</i> -	a diet which does not totally exclude but strictly limits foods of animal origin.
<i>Fructarianism</i> -	the diet is confined to foods such as fruit, nuts and certain vegetables, where harvesting allows the plant to flourish.
<i>Polo-vegetarianism</i> -	form of vegetarianism which includes the consumption of chicken.
<i>Lacto-vegetarianism</i> -	form of vegetarianism which includes the consumption of milk.
<i>Lacto-ovo-vegetarianism</i> -	form of vegetarianism which excludes red meat, poultry and fish but includes the consumption of dairy products and eggs.
<i>Pesco-vegetarianism</i> -	form of vegetarianism which includes the consumption of milk and eggs, and, occasionally, fish.
<i>Semivegetarian (demi-vegetarian quasi-vegetarian)</i> -	a self-classification amongst people who claim to have eating habits which focus on vegetarian foods, they eat some kind of meat on an occasional basis. Red meats are usually excluded.
<i>Reduced meat-eaters</i> -	people who classify themselves as reducing their overall meat consumption.

Researchers have taken two approaches when classifying people according to their meat-eating habits:

- (i) Specify precise meanings for terms such as vegetarian or vegan and clearly describe what is encompassed by the word 'meat'.
- (ii) Accept self definition, which implies less precision, but will reflect beliefs.

In this review the researchers' definitions have been accepted at their face value.

### **The images of meat, meat-eating and vegetarianism**

In primitive societies meat-eating had four symbolic images:

- \* strength
- \* manliness
- \* aggression
- \* passion

These images date back to early times when man was a hunter-gatherer and to some extent they probably persist in the subconscious mind today. These images also feature in the minds of vegetarians when they think about meat-eating, but more importantly meat also inspires images of:

- \* animality
- \* animal cruelty
- \* depriving animals of the right of life
- and \* the consumption of dead flesh

The image of animality is embodied in the well known phrase "you are what you eat". This phrase was originally used in a physiological sense. It stated in a very blunt way that your body is made from the food you choose. This saying has now acquired a symbolic meaning. Many vegetarians believe that humans behave like animals when they eat animal flesh. It increases animality in humans. Along with this meat eaters are thought to be more aggressive, and they acquire animality through that particular food.

Vegetarianism conjures up an opposite set of symbolic images. Traditionally, these have been:

- \* purity of lifestyle
- \* healthiness
- \* elevated spirituality
- \* femininity
- \* weakness

These images probably existed in the first vegetarian movement (Orphism) which, according to legend, started about 2500 years ago. In recent times crispness, freshness and light-eating have been added to the images of vegetarian eating, and these fit well with heightened consciousness about youthfulness and one's body shape. Vegetarianism is concerned with purity and spirituality, and a central theme is mental and physical harmony. It is held that this harmony is conducive to mental and physical health.

All these images help to influence an individual's attitudes and beliefs, which in turn helps to decide whether he or she is a meat-eater.

### **Trends in vegetarianism**

Surveys conducted in Australia, United Kingdom and United States of America have shown that the prevalence of vegetarianism and veganism during the 1980s and the first half of the 90s was between 3 and 7% (Worsley and Skrzypiec, 1996a; Richardson *et al*, 1994; Vegetarian Society, 1996; O'Connell *et al*, 1989). These surveys were performed before the Bovine Spongiform Encephalopathy (BSE) scare had any impact in late 1995, and the figures do not include individuals who were semivegetarian. About 15% of the adult population in the United Kingdom are semivegetarian, and in Australian adolescents (16 year olds) in the mid 1990s it was present in 16% of the women and 6% of the men.

The principal types of vegetarianism that occur in a community depend to some extent on the religious and ethnic backgrounds that are present. In a study in the United Kingdom which excluded individuals from religious and ethnic groups that prescribed vegetarianism, the main types of vegetarianism were as follows:

In that study there was a variety of vegetarian types. Whereas, in an earlier study in the United States of America it was reported that 90% of vegetarians were lacto-ovo-vegetarian (O'Connell *et al*, 1989).

Within Europe, vegetarianism is strongest in the United Kingdom, followed by Germany, the Netherlands and then Belgium. In the United Kingdom, the prevalence of vegetarianism has been rising steadily during the 1980s and 90s. It rose from 2.6% in 1985 to 4.5% in 1995 (Vegetarian Society, 1996). One third of that country's non-meat eaters are thought to be children under 16 years of age (Kirby, 1988), and somewhere between 7 and 14% of households have at least one member who is vegetarian.

Table 1 Main types of vegetarianism in the United Kingdom

Classification	Prevalence (%)
Lacto-ovo-vegetarian	34
Fish-eating vegetarian	25
Vegan	24
Lacto-vegetarian	12
Vegetarian	5

Every year a survey is conducted on the prevalence of vegetarians and reduced meat eaters in the United Kingdom. It is conducted on behalf of the Realeat Company which specialises in vegetarian foods. In 1990 the poll reported that 43% of the population that was over 16 years of age was eating less meat. A similar survey conducted by Dalepak Company in 1991 reported that 48% of the sample were eating vegetarian meals as an alternative to meat-based meals. Choosing vegetarian dishes and meals is now regarded as a "mass option" and is no longer a radical stance.

Food Hierarchies

A familiar theme throughout human history is that things which are highly prized by some individuals are thought to be highly defiling by others. This applies in the case of the different meats we eat. Red meats, and in particular beef, have the highest status for meat eaters, and they are the ones which are first avoided by some semivegetarians. There is, in fact, a theoretical hierarchy for meats and meat products which starts with beef and ends with fish, and this is shown in the broader context of other foods in Table 2. The reduced meat eater would typically progress towards vegetarianism by first giving up beef, then lamb, pork, poultry and finally fish. The species of origin, the appearance of the meat and the redness of the meat are thought to be key features which create this hierarchy (Twigg, 1979).

Table 2 Hierarchy of Foods

Taboo in most societies	Cannibalism Meat from carnivores Raw meat and blood
Accepted by meat eating societies, or, approximate order of avoidance by reduced meat eaters	Red meat - beef - lamb - pork Poultry Processed meats Fish
Accepted by vegetarians, or, approximate order of avoidance in macrobiotic diets	Eggs Cheese and milk Root vegetables Leaf vegetables Fruit and nuts Cereals

However, Worsley & Skrzypiec (1996a) found that beef sausages were the foremost item which is avoided on conversion to semivegetarianism (Table 3). Hamburger consumption on the other hand, persisted amongst a number of semivegetarians. In general, cooking and processing meat before it is purchased by the consumer helps to take the meat one step away from its original image. Through cooking it loses its redness and it is less likely to be linked with the live animal. This may explain the position of many of the other processed and cold meats in Table 3. Superimposed on this there may be other images that are strengthened by advertising, and these all complicate the forementioned generalisations.

It is often claimed that fish and chicken are chosen by semivegetarians because they are white meats, and so they are less likely to be linked with blood, and, because the image of the animal is less likely to provoke empathy. This would not necessarily apply when the carcass (fish or chicken) is sold with its head on and in particular when its eyes can be clearly seen.



**Table 3 Hierarchy of meats amongst 16 year old Australian semi-vegetarians**

	Number of semi-vegetarians who eat the respective meat for every meat-eater who consumes the same meat
Beef sausages	0.41
Pork	0.43
Crumbed veal	0.46
Lamb	0.46
Steak	0.47
Bacon	0.47
Roast beef/veal	0.51
Casserole (not chicken)	0.55
Mince meat	0.56
Cold meats	0.65
Processed meats*	0.67
Chicken	0.82
Fish	1.05

\* sausage rolls, pies, hamburgers

(Adapted from Worsley & Skrzypiec, 1996)

### Reasons for reduced meat-eating

The images that have just been described are the traditional symbols associated with meat and meat-eating. They are important because they form part of the foundation from which modern attitudes have developed. This section takes those images a step further and looks at some of the present day attitudes to meat-eating and provides some of the reasons for reduced meat-eating.

#### 1960s and 70s

In the 1960s and 70s vegetarianism was commonly associated with separatist cult movements. Many vegetarians lived in communes and there was strong emphasis on meditation and spiritual well-being. According to Sims (1978), at that time vegetarianism in the United States of America was strongly oriented towards ethics, but Dwyer *et al* (1974) reported that health concerns were in fact a more common reason for being vegetarian (Table 4). Within the health reasons it was thought that foregoing meat led to positive improvement in outlook and intellectual function, such as a calmer outlook, less grogginess and fresher clearer approaches to mental tasks. Few subjects stopped eating meat because they thought it was actually hazardous to their physical health. They were aware of, and mentioned, issues such as hormones, chemical residues, saturated fat and bacterial contamination of meat, but they were not the primary health concern.

Those who gave an ethical reason for being vegetarian felt that being vegetarian helped to express their philosophy of non-violence or non-injury to animals. Others believed that the dignity of life and respect for animals should lead humans to eat non-animal foods.

Metaphysical reasons revolved around the belief that consumption of a vegetarian diet was a means of achieving a more appropriate balance with oneself. This outlook was more common amongst vegetarians living in communes than in vegetarians not affiliated with a group, and, the group-affiliated vegetarians were particularly concerned about the environment and the wastefulness of eating meat, but not about overpopulation.

Political beliefs centred around using diet as a means of protest against meat processing, agribusiness and factory farming.

#### 1980s and 90s

Anti-meat attitudes during the 1980s and 90s evolved from those of the 1960s and 70s. The main changes have been the explosive increase in the number of reduced meat-eaters in Westernised societies, the move away from meditation and metaphysical concerns and towards ethics,



**Table 4**      **Why are you Vegetarian?**  
**Answers given by 100 American vegetarians in 1971/72**

Reason	%
Health	35
Ethical	25
Metaphysical	14
Ecology and oneness with nature	8
Food preferences	8
Economics	3
Religious	2
Political beliefs	2
Curiosity	1
Miscellaneous	2
<b>Total</b>	<b>100</b>

(Dwyer et al, 1974)

animal welfare, health, body image and the increasing reliance on easy to prepare foods. As the demand for reduced meat-eating increased during the late 1980s vegetarianism and meatless foods became commercialised. For example, by 1991, 90% of the pubs in the United Kingdom catered for vegetarians. The market opportunities have been big as can be seen from the following abridged list of items that were available in a United Kingdom supermarket in 1996, and were labelled as "suitable for vegetarians".

- |   |   |
|---|---|
| * Agnolotti with mushrooms.   | * Tomato and cheese pizza.              |
| * Bean burgers.   | * Tortelloni with garlic and herbs.     |
| * Broccoli and garlic potato bakes.                                   | * Vegetable chilli con carne with rice. |
| * Broccoli mornay.  | * Vegetable crispbakes.                 |
| * Broccoli in tomato and cream sauce.                                 | * Vegetable curry.                      |
| * Cauliflower cheese.   | * Vegetable Indian meal.                |
| * Cheese and broccoli quiche.   | * Vegetable lasagne.                    |
| * Cheese and onion rolls (in pastry).                                 | * Vegetable pasta bake.                 |
| * Cheese ravioli.   | * Vegetable paté with herbs.            |
| * Cheese and tomato pizza.  | * Vegetable pizza.                      |
| * Country vegetable flan.   | * Vegetable quiche.                     |
| * Creamy potato gratin.   | * Vegetable samosa.                     |
| * Falafel mildly spiced chick pea cutlet.                             | * Vegetarian sausages.                  |
| * Fresh vegetable pizza.  | * Vegetable spring rolls.               |
| * Garlic dressed spaghetti.   |   |
| * Gobi aloo saag.   |   |
| * Indian selection: onion bhajis, vegetable pakora, vegetable samosa. |   |
| * Italian style aubergine parmigiana.                                 |   |
| * Leek and mushroom bake.   |   |
| * Leek and mushroom crispbakes.                                       |   |
| * Margherita cheese and tomato pizza.                                 |   |
| * Medaglioni with cheese and herbs.                                   |   |
| * Nut cutlets.  |   |
| * Olive oil dressed gemelli.  |   |
| * Onion bhajia.   |   |
| * Paglia e fieno.   |   |
| * Pappardelle with sundried tomatoes and herbs.                       |   |
| * Pasta reale duetto cappelletti cheese and sundried tomatoes.        |   |
| * Quorn tikka masala with rice.                                       |   |
| * Ricotta and spinach cannelloni.                                     |   |
| * Tagliatelle with garlic and herbs.                                  |   |
| * Tofu soya bean curd.  |   |

These products were attractively presented with pictures of the cooked product on the packaging. They were easy and quick to prepare and they appealed to people who wanted something that was ready-to-cook, light and tasty to eat.

The reasons for reduced meat-eating during the 1980s and 90s are summarised in Table 5, and they are described in more detail in later sections. Although vegetarianism began to lose its links with spiritual and metaphysical outlooks during the 1980s, it has been suggested that for some vegetarians it was an alternative to joining an orthodox church or religion. The church was not satisfying everyone's spiritual needs, and, according to John Gummer the United Kingdom Minister of Agriculture during the early 1990s, food was becoming a "religion substitute" which enabled some people to make themselves feel more moral by the diet they chose. This probably explains the growing focus on animal welfare. Few people had direct experience or exposure to farming or slaughtering methods. They had perceptions of what they were like, and they reacted by taking a moral stance through the foods they chose not to eat rather than advocating practical changes in the way animals were reared and killed. The move away from the metaphysical and towards concerns about animal welfare may not be permanent, and no doubt the emphasis could veer-off in another direction in the future.

#### Semivegetarianism and reduced meat eating

The full vegetarian is a morally motivated individual who sees the health gains of being vegetarian as a bonus. There is a sense that the health gains are a symbolic reward for moral rectitude. Modern semivegetarianism is a diluted form of vegetarianism. The semivegetarian is also morally charged. In fact the primary concern amongst Australian semivegetarian women with eating meat is animal cruelty (Table 6). The negative sensory features of meat are an important additional deterrent, and, about one third of teenage semivegetarian and vegetarian women were reduced meat eaters principally because they thought that meat was fattening.

**Table 5** Summary of the reasons for reduced meat consumption during the 1980s and 90s

<b>Animal Welfare</b>	Moral reasons associated with the view that modern animal production is ethically unacceptable. By reducing consumption of specific or all meats, or by eating trusted welfare-friendly products only, the individual is divorcing him/herself from those production systems. It is usually a personal expression of rejection rather than a way of trying to change farming systems or society.
<b>Environment</b>	Moral concern that certain features of animal production harm the environment and have undesirable ecological consequences. The individual's conscience is quelled by abstaining from a particular meat or from all meat, and this has an element of long-term self-interest.
<b>Health</b>	Concern about one's own health. This has three features; firstly, avoiding the consumption of products which are normal ingredients in meat but are viewed as harmful (such as cholesterol and saturated fats). Secondly, avoiding the consumption of unnatural ingredients which could be hazardous (such as hormones, antibiotics, coccidiostats, pathogens). The third perception is cutting out meat with a view to avoiding specific health problems where the causal agent may not be clearly understood (cancer, hypertension). The decision to reduce meat consumption for health reasons is made out of self-interest or concern for the health of the family.
<b>Social priorities</b>	Some people reduce their meat consumption to conform or adapt to the lifestyle or standards of friends, relations or other influential people. One's own body image is an important example.

<b>Displeasure with meat</b>	This takes several forms. Total abstention from meat can be due to revulsion at the sight of meat and in particular any associated blood or blood-like drip. Some people find the sticky texture of meat abhorrent, whilst others dislike the taste and elastic mouth-feel of meat when they eat it.
<b>Metaphysical</b>	The individual abstains from certain meats for spiritual, religious, doctrinal or ethnic reasons. Eating meat is believed to impart negative effects, for example it arouses animal instincts in humans including greater aggression.
<b>Expense</b>	Poorer communities and households abstain from certain meats because of their cost.
<b>Inconvenience or inappropriate presentation</b>	Some meats may not be presented in a way which fits into "light", informal meals. Some meats may be avoided because they are presented in a form which is inappropriate for the take-away trade or are difficult to cook quickly at home.

It might be thought that the present trend toward reduced meat-eating reflects a desire to live a long and healthy life. However, the evidence suggests that only 19% of full and semivegetarian adolescent women viewed meat-eating as unhealthy, and this outlook existed in only 3% of non-vegetarians.

It is well recognised that semivegetarianism is strongest amongst females (Table 7). In a survey which compared the sexes according to status it was found that twice as many married females were semivegetarian compared with males and three times as many single females were semivegetarian. Amongst the males, vegetarianism tended to be more common than semivegetarianism in single men, whereas semivegetarianism was preferred to vegetarianism amongst single females.

**Table 6** Main concerns about eating meat amongst Australian adolescent women who were either vegetarian or non-vegetarian

	Proportion of the Subjects (%)	
	Full and semivegetarian	Non-vegetarian
Animal cruelty	61	37
Sensory (bloody, smell etc)	44	5
Redmeat is fattening	30	13
Meat is harmful to the environment	25	13
Meat eating is unhealthy	19	3

(Worsley and Skrzypiec, 1991)



Table 7 Self classified eating habits in British adults according to sex and marital status

	% of People		
	Meat Eaters	Semivegetarian	Vegetarian
Male married	35	22	17
Male single	13	9	22
Female married	40	40	48
Female single	12	29	13
Total	100	100	100

(Richardson et al, 1993)

As vegetarian foods are being more commercialised, they are becoming more attractive and popular in their own right. In 1990, a survey of 11 to 15 year olds in the United Kingdom that was sponsored by Barclays Bank showed that in 14% of the sample the favourite food was vegetarian. It is difficult to say whether this will grow. It may be that adolescent semivegetarianism or full vegetarianism is a phase which individuals grow through and that the recent swing towards reduced meat-eating will stabilise. In some individuals, however, it may persist into adulthood and their offspring will be brought-up as reduced meat eaters. Undoubtedly, there is a familial basis to vegetarianism. For example in a study on 100 Americans who had vegetarian leanings, it was shown that 63% claimed that they would raise, or were already raising, their children on the same vegetarian regime (Dwyer et al, 1974).

Although vegetarian eating should theoretically be cheaper than non-vegetarian eating, because it cuts out one of the most expensive items in a meal, vegetarian substitute foods are relatively expensive. For example, the cost of vegetarian frozen mince in a United Kingdom supermarket in September 1996 was twice the price for frozen minced beef. Similarly, vegetarian Lincolnshire sausages were 1.82 times the price. Vegetarian cheese on the other hand was either 15% cheaper or 25% dearer, depending on cheese type.

Animal Welfare and the Origins of Meat

One of the most thorough surveys on modern attitudes to meat eating was performed on 3,000 residents in the United Kingdom plus a further 500 members of the Vegetarian Society (Richardson et al, 1994). The principal negative beliefs amongst the general population towards eating beef were that it will increase the consumer's cholesterol level and that it involves eating hormones. No negative beliefs were reported which were linked to eating chicken. Whereas, the vegetarians thought that eating beef and chicken were both strongly linked to animal cruelty. In fact this was the strongest belief that vegetarians had about those meats (Table 8).

Another survey, involving 174 vegetarian women aged 15 to 30 years old, also showed that Animal Welfare was the predominant reason for becoming vegetarian. Eighty one percent claimed that Animal Welfare was of "great" importance in that decision, whereas only 24% said that health reasons were of "great" importance.

Beardsworth and Keil (1991a and b; 1992) held detailed interviews with 76 self-defined vegetarians in the United Kingdom, and some of the comments were revealing. In connection with Animal Welfare one interviewee made the following point:

"I've always been fond of animals ..... and when you reach the age where it is blatantly obvious that meat is animals, I didn't want any more to do with it".

Another interviewee changed abruptly to vegetarianism after seeing a television programme, as described as follows:

"..... it showed them electrocuting pigs ..... and I sat down in the canteen at work the very next day, and everybody was saying how awful this programme was, and they were all tucking into bacon cobs. I'd bought one of these bacon cobs as well ..... and I took one bite of it and it tasted awful ..... and I thought, well if that pig's gone through all that for me ..... and I've never touched it since. That was five years ago."

In connection with the origins of meat, one vegetarian explained:

"I was beginning to recognise what I was eating. And - it was flesh ..... it was something that had been living, and it had blood running through it, and a heart pumping it round ....."

Many of us probably recall our first realisation that meat comes from muscle, and clearly for some this is a disturbing experience which they have to reconcile for themselves.

Most modern vegetarians share the outlook that humans, as individuals, are not innately cruel to animals or disrespectful of the environment. But, cultural values have forced society towards being cruel and wasteful. To some vegetarians and semivegetarians applying logic in resolving such problems is less important than feeling at peace with the world and fellow creatures. For example, by denying themselves the right to eat animals they do not stop animal slaughter but they do quell any personal anxieties about being responsible for an animal's death. The moral consciences are eased. Perhaps more people are closer to this outlook than we realise. For example, when a large sample of meat-eaters in the United Kingdom were confronted with the hypothetical prospect of having to kill animals themselves in order to eat them, the majority said that they would cease eating meat altogether (Richardson *et al*, 1993).

In the same survey it was found that attitudes about cruelty to animals were focused on lamb, pork, beef and to a lesser extent chicken. Cruelty perceptions did not apply to meat products, fish or shellfish. Beliefs about eating fish were, however, linked to concerns about the environment.

**Table 8      Negative beliefs about eating meat amongst vegetarians (listed according to order of importance)**

- Eating Beef**
- \* Involves animal cruelty
  - \* Means eating hormones
  - \* Increases cholesterol levels
  - \* Risk of food poisoning
  - \* Means eating additives

- Eating Chicken**
- \* Involves animal cruelty
  - \* Means eating hormones
  - \* Risk of food poisoning
  - \* Means eating antibiotics
  - \* Means eating additives

There are pronounced cultural differences in attitudes to animals and animal welfare. Kellert (1988) classified the attitudes people have towards animals into nine categories (Table 9). Moral attitudes would equate most closely to concerns about livestock welfare, but humanistic welfare would to some extent feature in humanistic attitudes towards companion animals. In a comparison of Japanese, Germans and US Americans it was found that the moralistic attitude was very strongly developed amongst the Germans (Figure 1). The Japanese had a well developed humanistic outlook and Americans varied according to which part of the country they were raised. (Richardson *et al*)

**Table 9      Attitudes to animals**

There are nine basic attitudes towards animals:

- |    |                      |   |
|----|----------------------|---|
| 1. | <u>Naturalistic</u>  | An interest and affection for wildlife and the outdoors.  |
| 2. | <u>Ecologicistic</u> | Concern for the environment as a system, for interrelationships between wildlife species and natural habitats.                      |
| 3. | <u>Humanistic</u>    | Interest and strong affection for individual animals such as pets or large wild animals with strong anthropomorphic associations.   |
| 4. | <u>Moralistic</u>    | Concern for the right and wrong treatment of animals, with opposition to presumed over exploitation and/or cruelty towards animals. |
| 5. | <u>Scientific</u>    | Interest in the form and functioning of animals.  |
| 6. | <u>Aesthetic</u>     | Interest in the physical attractiveness and symbolic appeal of animals.   |
| 7. | <u>Utilitarian</u>   | Interest in the practical value of animals, or in subordination of animals for some practical benefit.                              |
| 8. | <u>Dominionistic</u> | Interest in mastery and control of animals.   |
| 9. | <u>Negativistic</u>  | Avoidance of animals due to indifference, dislike or fear.  |

In Australia, up to a third of teenage women experience difficulties in divorcing the image of the living animal and its production and slaughter from meat (Worsley and Skrzypiec, 1996a and b). Approximately half of the female interviewees said that they felt rearing animals to be killed was either "cruel" or "wrong". In the same survey, it was reported that about one third of the teenage women were in some way vegetarian, but, only 21% of the women looked upon themselves as being vegetarian or semivegetarian. This indicates that either they did not like or wish to label themselves as vegetarian or that they took abstinence from meat consumption for granted without recognising that it was synonymous with vegetarianism. When the interviewees were asked how strongly they agreed or disagreed with the statement "eating meat and animal cruelty are separate issues in my mind", 52% of the teenage non-vegetarian women agreed and 54% of the female semi-vegetarians plus vegetarians disagreed. This finding is important as it confirms that about half the young women who reduce their meat consumption believe that there are animal welfare problems in meat production. Only 26% of all teenage females in the survey agreed with the statement "I think meat production is done humanely". Animal slaughter seems to be a key issue. Seventy four percent of the semivegetarian plus vegetarian teenage women thought animal slaughtering was "awful". Thirty seven percent of the non-vegetarian teenage women

reported that they were concerned about animal welfare issues but had not taken up the semivegetarian option

Not surprisingly, the majority of teenage Australian males had a different outlook. Sixty five percent agreed that they were not bothered that meat comes from animals. Their appreciation of eating meat was stronger than concerns about welfare. Nevertheless, less than half (46%) of all the teenage males agreed with the statement "I think meat production is done humanely".

### Social pressures, outlook and behaviour

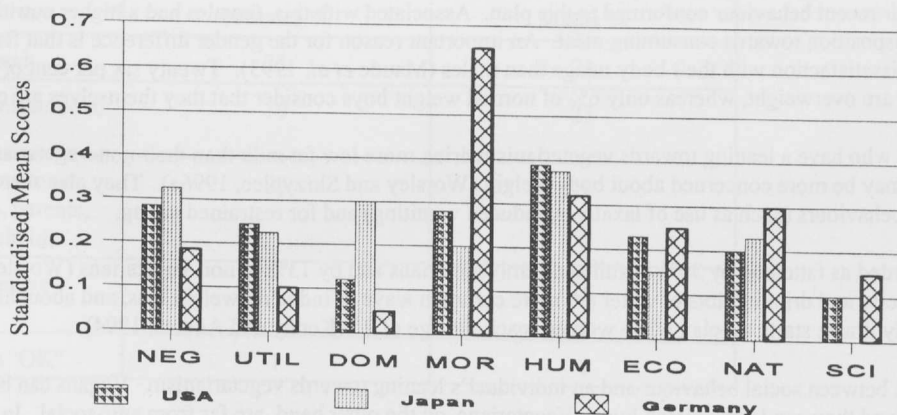
In the past the great majority of vegetarians were not socialised into giving up meat. Instead they critically inspected their own eating behaviour and society's food production systems and they decided to stop eating meat. Now, social pressures play a more important part and reduced meat-eating is more than a moral reflex in a minority. Those social pressures are particularly strong within the 12 to 24 year old sector and they include teenage idealism, group identity (or "clubbiness") and body image.

From a study in America it was claimed that 15% of the United States of America's 15 million college students eat vegetarian meals during a typical day. For example, at a college canteen in Ohio, 20% of the meals that were served were vegetarian. Forty eight percent of the female college students stated that vegetarianism was "in", and the corresponding figure for males was 33%. Many of the college women were restricting their consumption of meat.

A poll in the United Kingdom reported that one third of the country's 4.3 million non-meat eaters were children under 16. This age split came as a surprise, and it is probably due to two things. Firstly, the growing link between teenage idealism and the vegetarian concept in the individual's mind, and secondly the perpetration of that link amongst a large number of young teenagers by vegetarian promotion campaigns.

Teenage idealism is a normal healthy urge to change and improve the world. Young teenagers are drawn to extremist views by their simplicity and their "innocence", and they are prone to becoming engaged with apocalyptic guilt. The trials of puberty bring on a fierce sentimentality

**Figure 1** Different cultures have different leanings in their attitudes towards animals



and an intense emphatic squeamishness. Animals become a focus for all kinds of emotions, and with directed thinking this leads to vegetarianism.



The Vegetarian Society in the United Kingdom has been criticised on numerous occasions for exploiting teenage idealism. For example, in 1991 the Committee on Advertising Practice criticised their use of an anti-meat advertisement which showed a famished African child and a caption saying "Putting meat on your plate takes the food from hers". In 1992 the Advertising Standards Authority condemned a Vegetarian Society leaflet which described in detail the suffering of animals being slaughtered. The leaflet was said to be "capable of causing distress to those at such an impressionable age". The Vegetarian Society produces a magazine for children called Greenscene which, it is said, "makes no constructive use of teenage idealism, but is carefully calculated to harness sentimentality, self-doubt, guilt and clubbiness. The troubled compassion of children is manipulated to put them off meat altogether, and a vast opportunity is wasted" (Purves, 1990).

Vegetarianism is also promoted in schools through a campaign called SCREAM (School Campaign for Reaction Against Meat). This includes videos and information packs which are sent to schoolteachers, and lecture tours which focus on farming and abattoir practices. Some young teenagers become, what has been referred to as, "vege warriors". Vege-warriors want to convert the whole family to vegetarianism and "cannot stand living in a house in which the fridge contains a pork chop" (Times, 1990). When asked why they are vegetarian they are encouraged to reply "Animals are my friends, and I don't eat my friends".

A potential reason for being or becoming vegetarian is that one's friends are vegetarian, and it is important not to feel left out. This might be supported to some extent by the finding that adolescent female vegetarians (and semivegetarians) reported knowing more people who were vegetarian than did female non-vegetarians. However, they did not have more vegetarian friends (Worsley and Skrzypiec, 1996a). So, presumably, "clubbiness" is not an important feature amongst 16 year old vegetarians.

Parents, families and friends are, in general, tolerant of vegetarian practices, but, a third of vegetarians agreed that it was difficult to avoid eating meat at home. Adopting the label "vegetarian" can help some adolescents cope more successfully with pressures from family or peers without having to explain their motives. Concern about animal welfare would be regarded by some parents as a better motive than slimming and in this respect, teenage vegetarianism could be a front for covert weight reduction in some individuals.

Teenage vegetarian women appear to hold quite different views about health and about animals compared to non-vegetarians. Their outlook on the wider world differs too. For example they have been found to be more pessimistic about environmental issues, they placed less trust in scientific solutions to environmental problems, they valued equality more in relationships between the sexes, they were more concerned with being slim and they tended to restrict their energy intake more (Worsley and Skrzypiec, 1996a). They were also more likely to be influenced on how they dressed or behaved by what they saw on television.

Heather Morton, head of nutrition and social health at the University of South Australia, analysed 45 hours of three Australian television series: Neighbours, Home and Away and A Country Practice. The findings were telling. In every 20 to 25 minute episode there were about six scenes featuring eating and drinking, and the characters spent a quarter of their time eating and drinking. When the characters talked about food and drink more than half their statements were, according to Dr Morton, rubbish. All the food-related remarks concerned body image and slimming. All were made by women, and only 43% were scientifically correct.

People who are well-informed about nutrition and have a good understanding about nutrient density of foods tend to have more negative attitudes about meat and meat products (Shepherd and Towler, 1992). This could indicate that for the future as nutritional education improves, positive attitudes to meat consumption could decline. People with the better nutritional knowledge also planned on eating less meat in the future, and generally their recent behaviour conformed to this plan. Associated with this, females had a higher nutritional knowledge than males, they had a more negative predisposition towards consuming meat. An important reason for the gender difference is that females are more body-conscious and have a greater dissatisfaction with their body image than males (Maude *et al*, 1993). Twenty six per cent of normal weight Australian girls think that they are overweight, whereas only 6% of normal weight boys consider that they themselves are overweight.

Australian 16 year old females who have a leaning towards vegetarianism drink more low fat milk than their non-vegetarian counterparts, which also suggests that they may be more concerned about body weight (Worsley and Skrzypiec, 1996a). They also seem to go in more for extreme weight loss behaviours (such as use of laxatives, induced vomiting) and for restrained eating.

Red meat consumption is regarded as fattening by 30% of full and semivegetarians and by 13% of non-vegetarians (Worsley and Skrzypiec, 1996b). However, taking exercise and drinking lots of water are more common ways of inducing weight loss, and about half the girls skip meals. The concern about body image starts to relax when women reach the age of 25 (Kenny and Adams, 1994).

There is an interesting paradox between social behaviour and an individual's leaning towards vegetarianism. Vegans can be cut adrift from society because of their views and they can lead isolated lives. Vegetarians, on the other hand, are far from anti-social. In a survey of North American vegetarians it was found that they socialised more than non-vegetarians as shown by their greater frequency of entertaining, going out with friends and joining organisations (Freeland-Graves *et al*, 1986a). It is not known whether semivegetarians are any more or less introverted than non-vegetarians.

In some instances peoples' intentions on eating and their behaviour are not always closely linked. An extreme example would be when someone who is dieting or is semivegetarian goes on a binge which is totally contrary to his or her overall aims. It has been shown that the overall correlation between intention and behaviour in respect to eating high fat foods is high ( $r$  values up to 0.78), which suggests a good level

of personal discipline in this respect. Males tend to show least consistency between their beliefs, attitudes, intentions and behaviour when it comes to meat and meat products (Table 10).

**Table 10** Correlation coefficients between beliefs, attitudes, intentions and behaviour in men and women

	Beliefs vs Attitudes	Attitudes vs Intentions	Intentions vs Behaviour
<b>Meat</b>			
Males and females	0.70	0.64	0.73
Males 35-54 years*	0.65	0.51	0.55
<b>Meat Products</b>			
Males and females	0.63	0.59	0.78
Males 35-54 years*	0.51	0.51	0.74

\* age group at greatest risk from coronary heart disease.

(Shepherd and Towler, 1992)

The correlations between beliefs and attitudes give an indication of the relative importance of beliefs in forming attitudes, and hence in determining behaviour. Beliefs about taste were the most important belief feature and were more important than anything to do with health, fat content, cost or nutritional content of meat.

**Taste**

The main reason people eat meat is because they enjoy it (Harrington, 1995). It may however be an acquired or habit-based enjoyment as other people live quite comfortably without it. The taste of meat helps to reinforce that enjoyment and this is one of the main reasons why would-be vegetarians resist becoming vegetarian (Table 11). The vegetarians' attitude to meat is not totally negative. Some have a nostalgia and a craving for particular meats and especially for the taste and smell of bacon. Others find most cooked meats repulsive to the extent of causing nausea, and even some meat eaters are not particularly fond of its taste. For example, in a survey of Australian teenagers, 56% of all the females and 37% of all the males agreed that they did not like the taste of meat (Worsley and Skrzypiec, 1996a). Some people find preparing and cooking meat particularly repulsive. The stickiness of raw meat and the elasticity of meat when it is chewed can be objectionable. According to another survey, enjoyment of vegetarian foods was a more important reason for women becoming vegetarian than a dislike of meat (Neale *et al*, 1993). In summary, different people have different attitudes and it is difficult to generalise on the role of taste in making people like or dislike meat.

**Table 11** Reasons given by students for not becoming vegetarian

	Females %	Males %
Liked meat too much	23	23
Vegetarianism considered to be unhealthy	19	23
Pressured by others to eat meat (eg by peers, parents, meat-eating household)	20	16
Did not like alternative vegetarian foods	9	18
Killing for meat is "OK"	1	4

(Worsley and Skrzypiec, 1996a)

**Health and food safety**

Although Animal Welfare has been the single most important reason for people becoming fully vegetarian, health reasons are probably playing an important part amongst semivegetarians. There are concerns about cardiovascular disease, cancer, Creutzfeldt Jacob disease, Salmonellosis

and the consumption of hormones and antibiotics. At the other extreme it is widely held that strict vegetarianism can introduce health risks especially for infants.

There is a strong emphasis on mental and bodily health in the vegetarian outlook. Oneness and wholeness are important abstract concepts in the vegetarian's perception of mental and physical health. Oneness means that the individual is at peace with nature. Nature is often considered more valuable than culture, and this outlook has helped sustain the Natural and Health Food Industries. The vegetarian outlook despises the way that modern culture has moved towards greater reliance on refinement, cooking and further processing of foods. In ardent vegetarianism, food is believed to be more "natural" if it is eaten raw, and choosing raw foods is seen as an escape from highly processed foods which are regarded as junk (false) foods. Whole foods, such as whole grains and whole nuts are seen as more full of life and vibrant. Their wholeness is synonymous with being unadulterated. Whereas, meat is regarded as a dead food which is in the process of decomposing and eating it is synonymous with ingesting death. Even amongst meat-eaters meat does not have an image of being a "health food", but it may be thought to be "good for health".

All this emphasises the point that "healthy eating" is based on cultural influences as much as pathophysiology or nutritional science, and so beliefs about healthiness of foods are not necessarily accurate. In Australia, about one fifth of all 16 year olds think that it is healthier to be vegetarian than a meat eater (Worsley and Skrzypiec, 1996a). An immediate impression might be that fat intake is the main concern.

A study conducted during the 1960s in Australia showed that vegetarians tended to eat less fat than non-vegetarians. Whether this is true today is not certain. A recent study in the United Kingdom showed that vegetarian children had similar fat intakes to non-vegetarian children (Nathan *et al*, 1994). The vegetarian children made up their fat intake by eating more margarine in association with bread. On average, fat intake amongst Australian children and adults varies between 34 and 40% of total energy intake (Margarey and Boulton, 1994; Skurray and Newell, 1993). It has been recommended that for adults it should be reduced to 30%.

In the United Kingdom, the public's perception of risk factors for developing cardiovascular disease puts fat intake at a low priority (Silagy *et al*, 1993). Furthermore when a sample of meat-eaters were presented with the hypothetical situation that if the percentage of fat in meats was limited, would they increase their meat eating, the majority estimated that their meat eating would stay the same. This applied to both red meat eaters and red meat avoiders (Richardson *et al*, 1993). However, they thought that if beef contained polyunsaturated fat their meat eating habits would change.

The most important self criticisms in relation to cardiovascular disease are physical inactivity, followed by smoking, being overweight and a high dietary fat intake. In reality, the most important factor influencing susceptibility to coronary disease is age. The older one is the greater the risk (Fraser, 1994). Nevertheless there could be benefits from certain types of vegetarian foods. For example, it is thought that nuts may have a protective effect against platelet adhesion and aggregation because of their polyunsaturated fatty acids. Two studies conducted in Australia have shown the advantage of vegetarianism on serum cholesterol levels. One was conducted in teenage Seventh Day Adventists (Ruys and Hickie, 1976) and the other was in 2 to 4 year old lacto-ovo-vegetarian children (Zed & Heywood, 1977). The lower serum cholesterol levels in the infants was associated with lower dietary intakes of saturated fat and cholesterol.

There is sound epidemiological and experimental evidence which shows that vegetarianism is associated with a lower blood pressure. Melby *et al* (1989) found that vegetarian Seventh Day Adventists had a lower blood pressure than non-vegetarian Seventh Day Adventists, even after adjustment for any differences in tendency to being overweight. Similarly, when lacto-ovo-vegetarian Seventh Day Adventists were compared with meat-eating Mormons in Western Australia, the prevalence of mild hypertension was only 2% in the vegetarians compared with 10% in the meat eaters (Beilin, 1993).

Cross-sectional studies such as this are only suggestive of cause and effect relationships. A number of controlled studies have been done in Australia where subjects were put onto a lacto-ovo-vegetarian diet for a period and then returned to their normal diet. When healthy meat eaters with normal blood pressure took up the vegetarian diet their blood pressure fell, and it rose again on return to the meat-eating diet (Rouse *et al*, 1983). The same effect was observed with meat eaters who were mildly hypertensive (Margetts *et al*, 1988). It was not clear which components of the vegetarian diet caused the reduction in blood pressure, but it was not attributable to a change in sodium or potassium intake. Similarly, the effects were independent of any change in body weight or energy intake (Beilin *et al*, 1988). Two of the largest dietary changes that occur on introducing a vegetarian diet are increases in polyunsaturated to saturated fat ratio and fibre intake. When intakes of these nutrients were increased (in isolation from other dietary changes) to levels seen in vegetarians, no effects on blood pressure were seen in subjects who had normal blood pressure. It is unlikely that it is meat protein which is responsible for the blood pressure differences observed in these studies (Beilin & Burke, 1995). In addition it is unlikely that the absence of meat in the vegetarian's diet is responsible for their lower blood pressure. There is no clear indication as to which nutrient or nutrients are responsible.

Comparisons between the health of vegetarians and non-vegetarians are often complicated by differences in lifestyle and habits and because changes in eating pattern for reasons of existing illness. Only a few studies have attempted to exclude lifestyle differences, and some of the best evidence comes from medical reports on certain ethnic minorities and religious groups. A particularly useful group has been the Seventh Day Adventists. They usually refrain from smoking, drinking alcohol and coffee but they may or may not be vegetarian. Health records have shown that vegetarian Seventh Day Adventists have a lower prevalence of chronic disease in comparison with non-vegetarian Seventh Day Adventists (Knutsen, 1994). The risk of death from cancer has been shown to be lower in Seventh Day Adventists than in the general population (Mills *et al*, 1994), but there was no difference in the prevalence of cancer between vegetarian and non-vegetarian Seventh Day Adventists (Knutsen, 1994).

Thorogood *et al* (1994) examined the reasons for mortality in meat eaters and non-meat eaters over a 12 year period. The vegetarians in the study tended to be more health conscious and their mortality was about 20% lower than in the meat eating group. The vegetarians and fish



eaters had a 40% reduction in mortality from cancer, which was independent of any associated difference in prevalence of smoking or other important lifestyle variable. It was concluded, however, that the results do not justify excluding meat since several features of a vegetarian diet apart from not eating meat might reduce the risk.

The risk factors contributing to colon cancer have been studied in some detail in a group of South Australian adults (Steinmetz & Potter, 1993). Colon cancer is the third most common cancer in males in South Australia and the second most common in females. The most striking feature of the results was the link between colon cancer and egg consumption in females. High consumption of red meat was weakly associated with increased risk of colon cancer in both sexes.

In general, vegetarians believe that they are healthier than non-vegetarians. In the United States of America, vegetarians use alcohol, tobacco and prescription drugs less than non-vegetarians (Freeland-Graves *et al*, 1986b). However, when they rated their own incidence of health problems it turned out to be the same as for non-vegetarians. This suggests that their perception of their own health may not be true. Vegetarians are more inclined to believe that ill-health is nutritionally related (Table 12), they have a higher frequency of bowel movements and they are more inclined to use purgatives. Meat is not the only food which they feel is hazardous to health. Those listed most frequently were: preservatives, sugar, unspecified food additives, foods containing pesticides and sprays, hormones thought to be used in meat production, and fats. White sugar is avoided because animal charcoal is sometimes used to bleach it. Despite their high sugar intakes, vegan children have been found to have low levels of dental caries (Saunders and Manning, 1992).

The BSE scare has undoubtedly helped to reinforce the vegetarian view that meat-eating can be hazardous. It is surprising however that such a large scale reaction against eating beef could arise from such a low prevalence of a human disorder. Amongst other meats, concerns about food poisoning apply most to fish and shellfish, and concerns about hormones apply most to meat products (Richardson *et al*, 1993).

Thirty years ago, becoming vegetarian was commonly regarded as raising serious health risks. This view has almost completely reversed and many people now associate meat eating with health risks. It is recognised within the medical profession that dietary inadequacies can develop in vegetarians, and that children are at more risk than adults. Their requirements are greater and they are less likely to exert the same control over what they eat in comparison with adults. Some of the more tragic consequences of strict vegetarianism have in fact occurred in infants.

Several studies have examined the growth of vegetarian babies and children (Shull *et al*, 1977; O'Connell *et al*, 1989; Saunders, 1988 Saunders and Manning, 1992). The general finding has been that during the first six months growth is usually satisfactory in breast-fed babies. Vegetarian parents often wean their babies later than non-vegetarians, and between 6 and 18 months growth can be retarded. Breast milk alone no longer supplies adequate nourishment, and instead the infant relies more on the weaning diet. Vegan infants normally start off on a relatively high fibre diet and this is thought to suppress digestibility of their dietary fat. This probably contributes to the slower growth, smaller stature and leaner bodies which they have by two years of age. After that time they catch up with non-vegetarian children, and by five years of age there is usually no difference. Another reason why vegan children are underweight is that they may experience more ailments during infancy. Quite a high proportion of vegan children are not immunised against whooping cough or polio, for ethical reasons, as the vaccines may be raised in animals (Saunders and Manning, 1992). Yet another cause is malnutrition. Pugliese *et al* (1987) reported the case histories of seven 7 to 22 month old infants which had stunted growth because of malnutrition. In all cases the principal cause had been the parents' concern about what the infants ate. There were fears about obesity and atherosclerosis, and a desire to avoid "junk food". Because of this the childrens' energy intakes were restricted and so their growth was curtailed. Their failure to thrive was reversed when they were put onto a more liberal diet. These cases are another reflection of society's obsession with being slim and trim and its fear of heart disease.

Table 12 Percentage of vegetarians and non-vegetarians agreeing with the following statement on health

	Vegetarians	Non-vegetarians	p<
Vegetarians are healthier than non-vegetarians	85	30	0.001
Doctors are lacking in nutritional knowledge	80	66	0.05
Disease is caused by an imbalance of nutrients	75	57	0.05
Disease can be cured by fasting	49	12	0.001

(Freeland-Graves *et al*, 1986b)

Most nutrients can be provided by plant foods provided enough of the food is eaten. Nutritional deficiencies which pose the greatest threat to infants on a strict vegetarian diet are:

- \* Vitamin B<sub>12</sub>
- \* Vitamin D
- \* Retinol
- \* C<sub>20-22</sub> polyunsaturated fatty acids

Vitamin B<sub>12</sub> is present in substantial amounts only in animal foods. It is present in milk, but not in plentiful amounts, and its concentration greatly reduced if the milk is boiled. This vitamin is required for the synthesis of myelin which acts as an insulating sheath for nerves. Deficiencies of Vitamin B<sub>12</sub> at critical stages of nervous tissue development during infancy can result in irreversible damage to the nervous system. This was reported in a baby at Adelaide Children's Hospital whose parents were lacto-vegetarians (Wrighton *et al.* 1979). The baby was normal at birth and for the first three months. He was breast-fed by his mother who became a strict vegan when the baby was born. At three months he deteriorated mentally and developed anaemia. Treatment for Vitamin B<sub>12</sub> deficiency at nine months of age resolved the anaemia, but by 1½ years of age he was retarded intellectually and socially.

Zed and Heywood (1977) investigated the Vitamin B<sub>12</sub> status for 2 to 4 year old lacto-ovo-vegetarian children in Australia, and found that they had lower serum Vitamin B<sub>12</sub> levels than normal. Plant foods cannot be relied upon as adequate dietary sources of the vitamin, and so the period following weaning can raise risks if there is inadequate supplementation or if a disease occurs which diminishes pancreatic and intestinal function. Some infants who have been introduced to vegan-like diets at this stage have failed to thrive (Dwyer, 1991), but generally, vegetarian families are aware of the risks and take adequate supplements. Resistance to taking vitamin supplements has occurred amongst Rastafarian vegans and this has led to clinical deficiencies (Campbell *et al.* 1982). Rastafarian vegetarians have also been known to develop Vitamin B<sub>12</sub> deficiency, especially amongst inner city dwellers who experience limited exposure to the sun (Ward *et al.* 1982).

Parents of teenage children often become concerned when they learn that their daughter or son wants to become a vegetarian. The chief worry is whether they will receive enough protein and that they may develop a growth disorder, particularly if they are light eaters anyway. Generally, however, they are supportive in spite of those worries. Vegetarian children do in fact eat less protein than non-vegetarian children (Nathan *et al.* 1994). In addition, animal-based proteins have an advantage over plant sources of protein because they are generally of high quality, providing most of the essential and non-essential amino acids. However, the disadvantage of single plant protein sources can be overcome by combining different plant proteins. Deficiencies of protein or amino acids are unlikely in semivegetarians; semivegetarian men tend to eat less protein than vegetarian men (Draper and Wheeler, 1990).

The vegan diet is rich in polyunsaturated fatty acids as distinct from saturated fatty acids. Moreover, the ratio of linoleic/linolenic acid tends to be high and this is likely to inhibit the conversion of  $\alpha$ -linolenic acid to docosahexaenoic acid. This may be important as docosahexaenoic acid is absent from vegan diets. This acid is believed to play a role in retina and nervous system function.

Risk analysis using data from the 1983 National Dietary Survey for Australia has shown that the only food group which had a strong influence on the risk of developing iron deficiency was the consumption of meat. Those at lowest risk of developing a deficiency obtained a greater proportion of their total iron intake from meat (Cobiac & Baghurst, 1993). On average about one third of the Australia's iron intake comes from meat, and, up to 31% of girls and 7% of boys have iron intakes below the recommended dietary intake (Magarey & Boulton, 1993). Almost half the women between 18 and 49 years of age have an iron intake which is less than the recommended daily intake.

There are two forms of dietary iron; haem iron which is present in animal products and nonhaem iron which is present in foods of animal and plant origin. Nonhaem iron is usually less well absorbed than haem iron, and vegetarians have limited intakes of the haem form. This introduces a risk of iron deficiency anaemia amongst vegetarians, especially for milk fed infants and for women who either are prone to lose more than usual amounts of iron during menstruation, or, have reduced iron intakes whilst dieting.

Vitamin C is thought to assist in the absorption of nonhaem iron by the gut and this may be an important feature for vegetarians. Phytates, tannins, phosphates, fibres and soybean protein which are common ingredients in the vegetarian diet have an opposing effect, as they inhibit iron absorption by the gut.

Meat is an important source of dietary zinc, but other useful sources are bread, milk, cheese and breakfast cereals. In a survey of Australian adults it was estimated that over a quarter of the men and 40% of the women had zinc intakes that were 30% below the recommended daily allowance. This threshold of intake is generally accepted as conferring significant risk.

Above all, healthy eating requires moderation and informed choice. It should not be necessary to totally eliminate a particular food group to sustain good health. Humankind has survived on an omnivorous diet since its origins, and premature death is more closely linked to accidental death than to eating meat. Although there is a growing minority who think that meat-eating is harmful, 70 to 80% of all teenagers in Australia agree with the view that meat is needed for good health (Worsley and Skrzypiec, 1996a).

## Conclusions

Absolute vegetarianism is not a major threat to the meat industry. Although the number of vegetarians has risen over the past 10 years, the overall levels, for example in the United Kingdom, has remained between 2 and 5%. The real threat to the meat industry in the future is from reduced meat eating and semivegetarianism. Recent polls in the United Kingdom have estimated the prevalence of reduced meat eating at 20 to 40%. It is due to a number of features including:

- \* Pursuit of the vegetarian ethic which advocates abstention from meat as a route to harmony with animals and nature.
- \* Self-interest which is based on the belief that vegetarianism results in:
  - Freedom from catching BSE from eating meat.
  - Reduced risk of heart disease by avoiding redmeats.
  - Improved weight control and body image.
  - Avoids eating pesticides, hormone and antibiotic residues.

Semivegetarianism is particularly strong amongst young females and appears to be linked to a feminist outlook. It could persist through to adulthood, either out of conviction or from habit, and it could proliferate through the families that today's young semivegetarians eventually raise. When their children are brought-up in a semivegetarian household and with the outlook that semivegetarianism is the normal and right thing to do, reduced meat eating will become firmly established.

In recent times the principal reason for being vegetarian or semivegetarian has been concern about animals and animal welfare (Beardsworth and Keil, 1991a). Whilst the primary concerns amongst adult vegetarians are with "humaneness" and with "natural" images, in adolescents there is probably more emphasis on "humaneness" and "being beautiful". Teenage semivegetarians and non-vegetarians share similar outlooks but to different degrees. They both subscribe to prevailing social ideologies on environmentalism, animal rights and (amongst women) feminism. An important difference between semivegetarians and non-vegetarian adolescents is that about one third of semivegetarian and vegetarian females regard red meat as fattening, whereas this attitude is less common in non-vegetarians. Linked to this, vegetarians are usually more satisfied with their current weight status than non-vegetarians (Sims, 1978).

A reason for eating less meat which has not been adequately investigated is whether many people perceive that it is unnecessary to eat a lot of meat. Are there many people who reduce their meat consumption because they feel that they no longer need it? Another uncertainty is the proportion of adolescent females who specifically modify their meat-eating habits in anticipation of controlling their weight. It is known that over a quarter of normal weight high-school girls in Australia consider themselves to be overweight, and that the most common forms of self-enforced weight loss are taking exercise, drinking large amounts of water and skipping meals. Whether reduced meat eating is an additional specific feature is not clear.

The meat and livestock industries have little to gain from trying to convert full vegetarians back to an omnivorous diet. Instead, they need to address the concerns which lead to reduced meat eating in would-be semivegetarians:

- \* Improving the image of the meat and livestock industry.
- \* Improving the image of meat and meat-eating.
- \* Countering the vegetarian ethic.

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