ELSEVIER

Appetite 42 (2004) 265–272

Appetite

www.elsevier.com/locate/appet

Research Report

Food-related lifestyle and health attitudes of Dutch vegetarians, non-vegetarian consumers of meat substitutes, and meat consumers

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Received 25 March 2003; revised 11 November 2003; accepted 11 December 2003

Abstract

The aim was to investigate socio-demographic characteristics, and attitudes to food and health of vegetarians, *non*-vegetarian consumers of meat substitutes, and meat consumers in the Netherlands.

The sample used for this study (participants ≥18 years) was taken from the Dutch National Food Consumption Survey, 1997/1998. Vegetarians ($n = 63$) and consumers of meat substitutes ($n = 39$) had similar socio-demographic profiles: higher education levels, higher social economic status, smaller households, and more urbanised residential areas, compared to meat consumers ($n = 4313$).

Attitudes to food were assessed by the food-related lifestyle instrument. We found that vegetarians ($n = 32$) had more positive attitudes towards *importance of product information*, *speciality shops*, *health*, *novelty*, *ecological products*, *social event*, and *social relationships* than meat consumers ($n = 1638$). The health consciousness scale, which was used to assess attitudes to health, supported earlier findings that vegetarians are more occupied by health. Food-related lifestyle and health attitudes of meat substitute consumers ($n = 17$) were predominantly in-between those from vegetarians and meat consumers. The outcome of this study suggests that in strategies to promote meat substitutes for non-vegetarian consumers, the focus should not only be on health and ecological aspects of foods.

Keywords: Meat substitutes; Vegetarians; Food-related lifestyle attitudes; Health consciousness

Introduction

Our food choices do not only affect our own health, but the health of our ecosystems as well. Present food production systems, and meat production in Western society in particular, place a heavy burden on the environment. Besides pollution of air, soil, and water, negative environmental effects arise from the energetically inefficient conversion of feed into meat by animals: 1 kg of meat requires 3–10 kg of grain (Tilman, Cassman, Matson, Naylor, & Polasky, 2002). From a further increase in consumption of livestock products expected for the next 50 years on a global level, the inevitability of a more sustainable food production follows as a matter of course. Purely from an environmental point of view, substituting consumption of meat by alternative protein rich products made from plant proteins, so-called Novel Protein Foods, would be an attractive option (Jongen & Meerdink, 2001; Smil, 2002). But would that also be attractive to consumers?

Traditional vegetarian products such as tofu and tempeh have been eaten for centuries in Asian countries. Just recently in the nineties, new meat substitute products such as Tivall® or Quorn®, became widely available in Europe (Davies & Lightowler, 1998; McIlveen, Abraham, & Armstrong, 1999). Despite the increase in popularity of meat substitutes since several food-safety crises in the meat industry, the market share (in volumes) of meat substitute products as a meal component was still 1% compared to 76% of meat and poultry in the Netherlands in 2002 (PVE, 2003). Meat substitute products are therefore not yet absolute alternatives for meat to the majority of consumers, except for vegetarians.

The term ‘vegetarian’ is not very straightforward, but it generally describes a range of diets that avoids animal flesh (meat, fish and poultry), with varying degrees of restriction (British Nutrition Foundation, 1995; Silverstone, 1993).

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0195-6663/$ - see front matter © 2004 Elsevier Ltd. All rights reserved.
doi:10.1016/j.appet.2003.12.003

Vegetarian diets are not only associated with a decreased frequency of meat consumption, moreover with a particular belief or lifestyle. Moral and ethical beliefs, consisting of rejections of killing animals and concerns for animal welfare are reported as the main reason to avoid meat in the Western world (Beardsworth & Keil, 1992; Kalof, Dietz, Stern, & Guagnano, 1999; Kenyon & Barker, 1998; Worsley & Skrzypiec, 1998). Vegetarians obviously express a certain philosophy in their choice of foods (Allen, Wilson, Ng, & Dunne, 2000; Lindeman & Sirelius, 2001; Twigg, 1983). Besides moral and ethical beliefs, health reasons seem to play an increasing important role to hold a vegetarian lifestyle nowadays (Barr & Chapman, 2002; Jabs, Devine, & Sobal, 1998). The appearance of so-called part-time vegetarians has also been explained in the perspective of an increasing number of health consciousness consumers (Janda & Trocchia, 2001).

For promotion of environmentally acceptable Novel Protein Foods it is essential to know if current consumers of meat substitutes, other than vegetarians, have a higher interest in environmental and health issues as well. The aim of this study was therefore to compare socio-demographic characteristics and attitudes to food and health between vegetarians, non-vegetarian consumers of meat substitutes, and meat consumers in the Netherlands.

Methods

Socio-demographic characteristics

We used data from a nation-wide sample of the Netherlands, the Dutch National Food Consumption Survey, 1997/1998 (DNFCS), to identify vegetarians, non-vegetarian consumers of meat substitutes and meat consumers, including their socio-demographic characteristics. The initial purpose of this survey was to describe consumption, and its development over time, of different food groups in the Netherlands. Food consumption data were collected from April 1997 until March 1998, by means of a two-day food diary of a representative random sample survey of households in the Dutch population with a caretaker aged <75 years. In addition, a sample of households with a caretaker >75 years was obtained, which resulted in a total sample of 6250 subjects aged 1–97 from 2564 households (Fig. 1). Recording days were equally distributed throughout the week and across seasons, but not during holidays (Hulshof, Kistemaker, & Bouman, 1998). Besides information on food consumption of the respondents, personal data were assessed and inquiries were made on specific dietary lifestyles.

For our purposes, the additional elderly sample of DNFCS and persons younger than 18 years were excluded from analysis to minimise influences of parents or nursing homes in the choice for a certain diet. Respondents with other specific dietary lifestyles, such as macrobiotic or anthroposophic, were excluded from our study. The remaining respondents were assigned to one of the following groups (Fig. 1):

1. Vegetarians ($n = 63$)
   Vegetarians were respondents who indicated to have a vegetarian dietary lifestyle (i.e. eating meat less than once a week). Vegans ($n = 6$), often referred to as strict vegetarians, were also included in the vegetarian group and were respondents who indicated to have a strict vegetarian lifestyle.
2. Consumers of meat substitutes ($n = 39$)
   Consumers of meat substitutes were respondents who recorded the consumption of at least one meat substitute product and who did not indicate to be vegetarian.
3. Meat consumers ($n = 4313$)
   Meat consumers were respondents who did not indicate a specific dietary lifestyle and did not consume a meat substitute product during the recording days.

Based on literature (Freeland-Graves, Greninger, & Young, 1986; Jabs et al., 1998; Perry, McGuire, Neumark-Sztainer, & Story, 2001) describing socio-demographic characteristics associated with vegetarianism, we selected the following variables for our study: gender, age, household size (number of persons in the household), education level (from primary school to university training, categorised into 7 classes), gross household income (from €0 to >€3630, categorised into 15 classes), degree of urbanisation of residential area (from <500 addresses/km^2 to >2500 addresses/km^2, categorised into five classes) and social economic status (SES, based on educational, occupation and occupational position, and categorised into five classes).

The number of persons with a vegetarian housemate was also taken into account for both vegetarians and consumers of meat substitutes, in order to verify potential social influence on specific dietary lifestyle or consumption of meat substitutes. Meat substitute products available in 1997 and 1998 were defined according to Dutch Nutrient Database codes 1996 (NEVO, 1996) as tofu, tempeh, Tivall®, and Quorn®, for example vegetarian burgers, schnitzels and stir-fry products.

Food-related lifestyle instrument

The food-related lifestyle instrument (Bredahl & Grunert, 1998; Brunsø & Grunert, 1998; Grunert, Brunsø, & Bisp, 1997) was used as a tool to measure attitudes to food, i.e. how people link food to the attainment of life values, and to compare these between vegetarians, consumers of meat substitutes and meat consumers. This 69-item questionnaire (seven-point scales, from 'totally disagree' to 'totally agree') measures 23 lifestyle dimensions, that cover

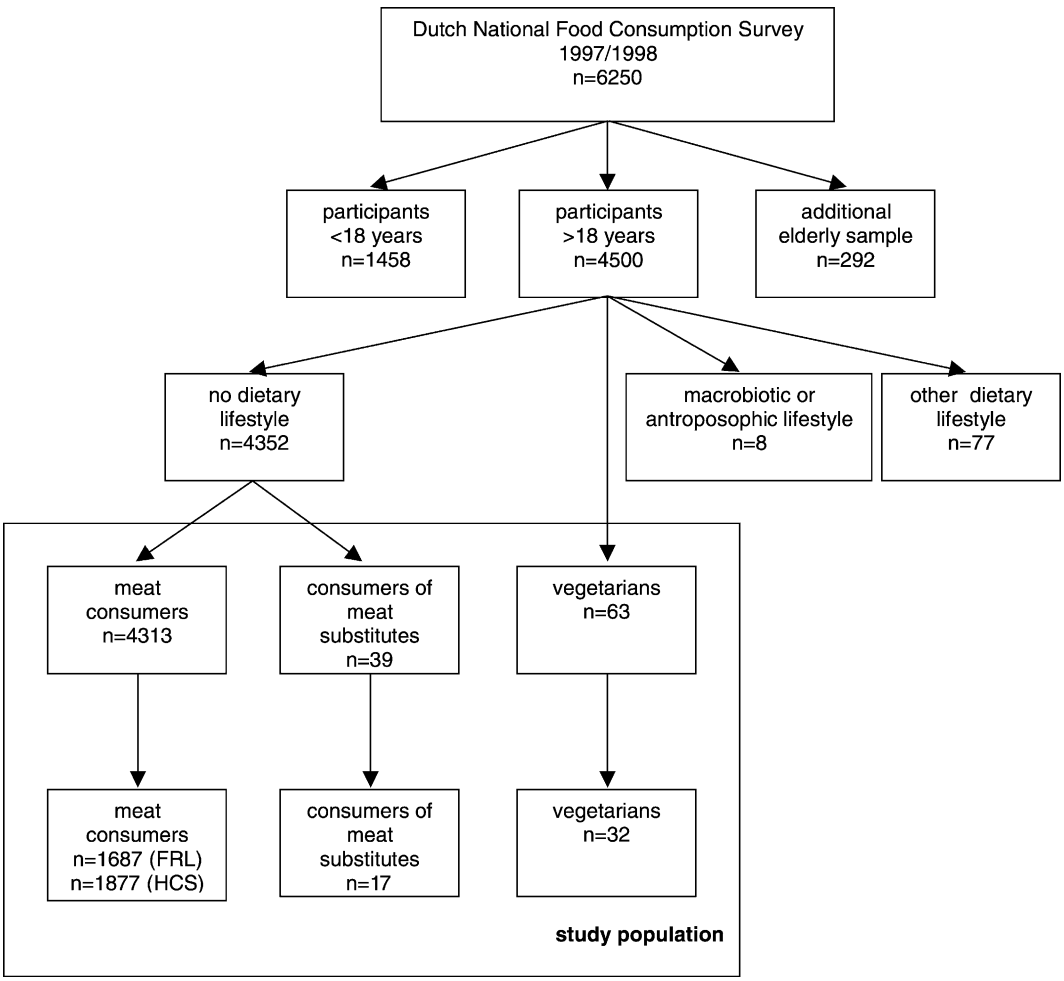

Fig. 1. Scheme of the study population taken from the Dutch National Food Consumption Survey 1997/1998. A two-day food diary and personal data were taken from the study population. A selection of the respondents (lower row of boxes) also filled out the food-related lifestyle questionnaire (FRL) and health consciousness scale (HCS).

the assessment, preparation and actual consumption of food products: *ways of shopping*, *quality aspects*, *cooking methods*, *consumption situations* and *purchasing motives*. The construct validity of the food-related lifestyle dimensions has been extensively tested, indicating that the factor structures are stable across cultures and over time (Scholderer, Brunsø, Bredahl, & Grunert, 2004).

The questionnaire was translated into Dutch and rated by a subset of DNFCS respondents that were holding main responsibility for household shopping and cooking (Fig. 1).

Health consciousness scale

An additional questionnaire on health attitudes was analysed in this study to further explore the role of health motives in the three consumer groups. Health consciousness assesses the degree to undertake health actions and was operationalised by the health consciousness scale on anchored line scales (Oude Ophuis, 1989; Schifferstein & Oude Ophuis, 1998).

In this study, the Dutch version of the 11-item health consciousness scale was rated on a five-point scale (ranging from 'totally disagree' to 'totally agree') by the subset of DNFCS respondents (Fig. 1).

Data analysis

Gender was compared between the consumer groups by using a Pearson's X^2-test (pair wise), other categorical socio-demographic variables were rearranged into three ordinal classes for which X^2-tests for trend were used. One-Way ANOVA tests (two-tailed) with post hoc tests (Games-Howell) were used to compare age and household size between consumers. Multivariate analyses of socio-demographic variables were performed by a logistic regression procedure with the forward stepwise method, in which the meat consumer group was taken as the reference group. In the logistic regression analysis the original classes from the socio-demographic variables were used. We excluded SES

from regression analysis due to high correlation with education level (Pearson's $r = 0.62$).

The mean scores on the 23 dimensions of the food-related lifestyle instrument were compared between vegetarians, consumers of meat substitutes, and meat consumers by One-Way ANOVA (two-tailed) with post hoc tests (Games-Howell). Respondents with missing values for one of the items in a scale were excluded from analysis. In addition, Cronbach α's were assessed as a measure of internal reliability.

A Principal Component Analysis with varimax rotation was run with the health consciousness scale, and mean scores on the derived factors compared between the consumer groups by One-Way ANOVA (two-tailed) with post hoc tests (Games-Howell). All analyses were conducted with SPSS 10.0 statistical software and p-values below 0.05 were considered statistically significant.

Results

Socio-demographic characteristics

A comparison of socio-demographic characteristics showed a trend of both vegetarians and consumers of meat substitutes, towards smaller households, higher education levels, higher SES, and more urbanised residential areas, relative to meat consumers. In addition, the vegetarian group consisted of a higher percentage of women compared to meat consumers (Table 1). The gender distribution between consumers of meat substitutes and meat consumers was not significantly different. Among vegetarians, there were 19 respondents (30%) who lived with a vegetarian housemate, while this applied for only two consumers of meat substitutes (5%).

Multivariate analyses indicated that gender ($\beta = 0.81$, SE $= 0.31$, $p < 0.009$), education ($\beta = 0.40$, SE $= 0.09$, $p < 0.001$), urbanisation ($\beta = 0.38$, SE $= 0.12$, $p < 0.002$), and household size ($\beta = -0.37$, SE $= 0.12$, $p < 0.003$) were the predictors of being a vegetarian (Goodness of Fit, $X^2(8) = 4.92$, $p = 0.77$). Being a meat substitute consumer was predicted by the degree of urbanisation ($\beta = 0.72$, SE $= 0.18$, $p < 0.001$), household size ($\beta = -0.40$, SE $= 0.16$, $p < 0.02$) and education ($\beta = 0.38$, SE $= 0.11$, $p < 0.001$) (Goodness of Fit $X^2(8) = 5.42$, $p = 0.71$).

Food-related lifestyle instrument

Vegetarians scored significantly higher for items concerning *importance of product information, speciality shops, health, novelty, ecological products, social event,* and *social relationships* than meat consumers. Woman's task was rated lower by vegetarians than meat consumers (Table 2).

Compared to meat consumers, meat substitute consumers displayed higher scores on *price-quality relation* and lower scores on *woman's task*. *Social event* was less important to meat substitute consumers than vegetarians, while *price quality relations* was more important to them.

It must be noted that in this Dutch sample a number of food-related lifestyle dimensions had internal consistency values below 0.60 (Table 2).

Table 1
Socio-demographic characteristics of the study population: vegetarians, consumers of meat substitutes and meat consumers

Socio-demographic characteristics	Vegetarians ($n = 63$)	Consumers of meat substitutes ($n = 39$)	Meat consumers ($n = 4313$)
Gender (% of women)	73[a]	59	54[a]
Age (years)	41.1 (14.8)	39.2 (14.8)	42.4 (14.8)
Household size (persons)	2.2 (1.2)[b]	2.1 (1.1)[c]	3.0 (1.4)[b,c]
Education level			
%Low	19[d]	18[e]	44[d,e]
%Medium	34[d]	26[e]	34[d,e]
%High	47[d]	55[e]	22[d,e]
Household income			
%Low	41	43	44
%Medium	42	40	37
%High	17	17	20
Social economic status			
%Low	13[f]	21[g]	40[f,g]
%Medium	41[f]	28[g]	21[f,g]
%High	46[f]	51[g]	38[f,g]
Urbanisation level			
%Low	10[h]	8[i]	18[h,i]
%Medium	19[h]	13[i]	42[h,i]
%High	71[h]	80[i]	40[h,i]

Age and household size values are mean (SD).
[a] Vegetarians versus meat consumers, $X^2(1) = 9.13$, $p < 0.004$.
[b] Vegetarians versus meat consumers, $F(2, 4412) = 18.68$, $p < 0.0005$.
[c] Meat substitute consumers versus meat consumers, $F(2, 4412) = 18.68$, $p < 0.0005$.
[d] Vegetarians versus meat consumers, $X^2(1) = 25.15$, $p < 0.0005$.
[e] Meat substitute consumers versus meat consumers, $X^2(1) = 21.87$, $p < 0.0005$.
[f] Vegetarians versus meat consumers, $X^2(1) = 9.78$, $p < 0.003$.
[g] Meat substitute consumers versus meat consumers, $X^2(1) = 5.22$, $p < 0.03$.
[h] Vegetarians versus meat consumers, $X^2(1) = 19.15$, $p < 0.0005$.
[i] Meat substitute consumers versus meat consumers, $X^2(1) = 18.49$, $p < 0.0005$.

Health consciousness scale

Two factors were extracted from the Principal Component Analysis, largely corresponding to earlier description by Schifferstein and Oude Ophuis (1998) as *health sacrifice* and *health occupied* (Table 3). The higher scores of vegetarian consumers for *health occupied* were found significantly different from meat consumers, $F(2, 1921) = 3.32$, $p < 0.04$. Meat substitute consumers did not differ in health consciousness from meat consumers.

Table 2
Food-related lifestyle attitudes of vegetarians, consumers of meat substitutes and meat consumers

Food-related lifestyle attitudes	Cronbach α	Vegetarians ($n = 32$)		Consumers of meat substitutes ($n = 17$)		Meat consumers ($n = 1638$)	
		Mean	SD	Mean	SD	Mean	SD
Ways of shopping							
Importance of product information	0.78	4.5[a]	0.9	4.6	1.5	3.8[a]	1.3
Attitude towards advertising	0.52	2.7	1.1	3.0	1.5	3.2	1.1
Enjoyment from shopping	0.53	4.2	1.1	4.5	1.4	4.0	1.2
Speciality shops	0.51	4.0[b]	1.1	3.5	1.2	3.3[b]	1.2
Price criteria	0.70	4.2	1.2	5.0	1.4	4.5	1.4
Shopping list	0.59	4.9	1.1	4.3	1.3	4.6	1.4
Quality Aspects							
Health	0.82	5.4[c]	1.2	4.4	1.7	4.0[c]	1.4
Price quality relation	0.58	4.7[d]	0.7	5.5[d,e]	0.7	4.9[e]	1.1
Novelty	0.72	4.7[f]	1.2	4.5	1.2	4.1[f]	1.4
Ecological products	0.80	4.8[g]	1.6	3.7	1.9	3.0[g]	1.3
Taste	0.52	4.6	1.0	4.4	0.8	4.8	0.9
Freshness	0.75	5.8	0.9	5.3	1.1	5.5	1.2
Cooking methods							
Interest in cooking	0.71	3.5	1.4	3.9	1.4	3.5	1.4
Looking for new ways	0.88	4.5	1.6	4.4	1.6	3.9	1.6
Convenience	0.65	2.4	1.1	2.9	1.6	2.7	1.2
Whole family	0.38	4.3	1.1	3.4	0.8	4.1	1.2
Planning	0.50	3.5	1.5	3.5	1.5	3.6	1.2
Woman's task	0.74	1.9[h]	1.0	2.0[i]	0.8	3.0[h,i]	1.5
Consumption situation							
Snacks versus meals	0.51	2.3	0.7	2.3	0.8	2.2	0.9
Social event	0.59	3.9[j,k]	1.3	2.4j	1.7	3.0[k]	1.3
Purchasing motives							
Self-fulfilment in food	0.63	4.3	1.3	3.9	1.1	4.2	1.2
Security	0.60	3.3	1.3	3.3	1.3	3.7	1.2
Social relationships	0.63	5.1[l]	0.7	4.9	1.1	4.5[l]	1.2

Sum scores of scales were divided by number of items, items were rated on seven-point scales ranging from 'totally disagree' to 'totally agree'.
[a] Vegetarians versus meat consumers, $F(2, 1659) = 7.32$, $p < 0.002$.
[b] Vegetarians versus meat consumers, $F(2, 1663) = 5.32$, $p < 0.006$.
[c] Vegetarians versus meat consumers, $F(2, 1663) = 13.06$, $p < 0.0005$.
[d] Vegetarians versus meat substitute consumers, $F(2, 1671) = 3.09$, $p < 0.05$.
[e] Meat substitute consumers versus meat consumers, $F(2, 1671) = 3.09$, $p < 0.05$.
[f] Vegetarians versus meat consumers, $F(2, 1651) = 3.32$, $p < 0.04$.
[g] Vegetarians versus meat consumers, $F(2, 1671) = 33.42$, $p < 0.0005$.
[h] Vegetarians versus meat consumers, $F(2, 1660) = 11.59$, $p < 0.0005$.
[i] Meat substitute consumers versus meat consumers, $F(2, 1660) = 11.59$, $p < 0.0005$.
[j] Vegetarians versus meat substitute consumers, $F(2, 1671) = 7.90$, $p < 0.0005$.
[k] Vegetarians versus meat consumers, $F(2, 1671) = 7.90$, $p < 0.0005$.
[l] Vegetarians versus meat consumers, $F(2, 1667) = 3.86$, $p < 0.03$.

Discussion

The socio-demographic profile of vegetarians: predominantly women, highly educated, high SES, small households, and urbanised residential areas, was largely consistent with previous findings (Fraser, Welch, Luben, Bingham, & Day, 2000; Freeland-Graves et al., 1986; Perry et al., 2001). Consumers of meat substitutes had similar socio-demographic characteristics, apart from the higher number of women. It has been stated that women are the main users of these products (McIlveen et al., 1999). However, the ratio of male/female non-vegetarian consumers of meat substitutes was found almost equal in the representative sample we used for this study. This implicates that for a thorough description of socio-demographic characteristics of consumers of meat substitutes it is useful to distinguish vegetarian from non-vegetarian respondents.

Differences in food-related lifestyle attitudes between vegetarians and meat consumers were dispersed among the five aspects of food-related lifestyle: *ways of shopping, quality aspects, cooking methods, consumption situations* and *purchasing motives*. Vegetarians had positive attitudes towards shopping in speciality shops and a high preference

Table 3
Health consciousness of vegetarians, consumers of meat substitutes and meat consumers

	Factor 1 health sacrifice	Factor 2 health occupied
Eigen value	5.2	1.2
Cronbach α	0.89	0.72
Percent of variance (%)	36	22
Vegetarians ($n = 32$)	3.4 (0.6)	3.2 (0.6)[a]
Consumers of meat substitutes ($n = 17$)	3.3 (0.9)	3.0 (0.7)
Meat consumers ($n = 1877$)	3.2 (0.7)	2.9 (0.7)[a]

Values are mean (SD), items were rated on five-point scales ranging from 'totally disagree' to 'totally agree'. *Items factor 1*. I consider myself very health conscious; I think it is important to know well how to eat healthy; My health is so valuable to me, that I am prepared to sacrifice may things for it; I think that I take health into account a lot in my life; I have the impression that I sacrifice a lot for my health. I often dwell on my health (Schifferstein and Oude Ophuis (1998) reported these items loading on the opposite factor); I am prepared to leave a lot, to eat as healthy as possible. *Items factor 2*. I really don't think often about whether everything I do is healthy [R]; I do not continually ask myself whether something I do is healthy [R]; I don't want to ask myself all the time, whether the things I eat are good for me [R]; I have the impression that other people pay more attention to their health than I do [R] (Schifferstein and Oude Ophuis (1998) reported these items loading on the opposite factor.); [R] Items were reversed for analysis.

[a] Significant difference between vegetarians and meat consumers.

for ecological products, which was in line with our expectations. Health was more considered an important quality aspect by vegetarians than meat consumers, which was also supported by the health consciousness questionnaire. Furthermore, vegetarians paid a higher attention to product information labels and were more interested in new food products and new recipes. The importance of social aspects in eating was reflected in the purchasing motive to reinforce social relationships, but also regarding consumption situations: vegetarians seem to prefer to eat together with friends. Vegetarians do obviously not feel that the kitchen is a woman's domain, which can probably be explained by the large proportion of females in the vegetarian group.

Non-vegetarian meat substitute consumers appeared to be less distinguishing in food-related lifestyle attitudes compared to vegetarians, and took an intermediate position for most dimensions. Despite the small sample size of this consumer segment, the higher importance attached to price/quality, lower interest in social aspect of meals, and more feminist view with respect to food preparation were remarkable. One might have expected a higher attention of these consumers to health, ecological products or speciality shops, but this was not observed in our study. Janda and Trocchia (2001) have described vegetarian oriented consumers as individuals who do not consider themselves vegetarians, but prefer greater vegetarian options relative to meat-based choices. In line with the results presented here, vegetarian oriented consumers were found to be much more similar, in terms of concern for the environment, to non-vegetarians than strict vegetarians. However, Janda and Trocchia (2001) did show a higher involvement of these consumers in nutritional health aspects.

Definite personal values expressed in food choice, such as ecological ideologies, are reported typical for vegetarians (Lindeman & Sirelius, 2001). Food-related lifestyle can be seen as a means of people to use food to achieve these personal life values (Brunsø, Scholderer, & Grunert, 2002). Although the meat avoiding behaviour of non-vegetarian consumers of meat substitutes resembles that from vegetarians, they do not seem to hold strong ideologies, given that their food-related lifestyle attitudes did not differ from meat consumers' attitudes to a great extent.

The study described in this paper has a number of limitations. First of all, we used data from a survey that had been collected previously. The two consumer segments of interest, vegetarians and non-vegetarian consumers of meat substitutes were not well represented in the overall sample. The proportion of vegetarians was around 1%, which is low compared to other survey data such as 4% in the UK (British Nutrition Foundation, 1995). We think that due to different descriptions used for the term 'vegetarian' these figures can vary substantially. Moreover, some vegetarian consumers do eat meat occasionally (Barr & Chapman, 2002). The definition used in this study was based on 'eating meat less than once a week', which could have resulted in a relatively low percentage of vegetarians. These small numbers of vegetarians and consumers of meat substitutes could have simplified the interpretation of the results, particularly with the description of food-related lifestyle and health attitudes of the subsample. Despite this, the illustrated attitudes of vegetarians were quite consistent with previous reports. In addition the data was taken from a large representative food consumption survey. We therefore think that this study still provides some valuable insights of these Dutch consumer groups in 1997/1998. It is well possible that there was some misclassification of consumers, since vegetarians were identified by means of self-reporting of dietary lifestyle and non-vegetarian consumers of meat substitutes were identified on the basis of consumption of a meat substitute product during the recording period. One of the disadvantages of a two-day food diary is that it does not reflect long-term intake (Buzzard, 1998). Our classification included at least the individuals who were familiar with the use of meat substitutes. Although it might still be possible that there are subjects in the meat consumer group who consume meat substitutes on a regular basis. The method used to assess attitudes to food was the food-related lifestyle questionnaire, which had successfully been applied to European food cultures: Denmark, Great Britain, France and Germany (Bredahl & Grunert, 1998; Brunsø & Grunert, 1998; Grunert et al., 1997). We found that some of the food-related lifestyle scales had fairly low reliabilities in the Dutch sample. For the purpose of this study, we decided to maintain the structure of the questionnaire (23 lifestyle

dimensions in five domains) in order to make comparisons between the different consumer groups for the various attitudinal aspects with respect to food. The data used for this study was collected in 1997 and 1998. The increase in market share of vegetarian products has often been associated with food crises, e.g. BSE, foot and mouth disease, which occurred successively from 1998 to 2000. A recent report from the Netherlands (Aurelia, 2002) indicates that concerns about meat are not an important motive to buy meat substitute products; therefore we think our study is still relevant.

The term 'vegetarian' is ambiguous, and there have been debates on how to use it, either as a typical food behaviour (e.g. avoiding meat) or as an ideology (e.g. caring for animals). It has even been proposed to remove the term completely from scientific literature (Weinsier, 2000). With the rising number of people with an interest in vegetarian diets, several new terms are introduced such as part-time vegetarian, semi- or demi-vegetarian, pseudo-vegetarian, or vegetarian-oriented consumer, which essentially seem to have the same meaning (British Nutrition Foundation, 1995, Janda & Trocchia, 2001, Silverstone, 1993; Worsley & Skrzypiec, 1998).

The concept of vegetarianism is broadening. In future research we will therefore collect data on attitudes and motives of consumers with different levels of replacement of meat by vegetable based products. A significant decrease in meat consumption by Novel Protein Foods can only be reached when consumer wishes for meat substitute products of these various segments are identified and understood.

Although the socio-demographic profile of meat substitute consumers was comparable to those from vegetarians, they did not have the same attitudes towards food. Vegetarians considered ecological and health themes in relation to food important, while this was not observed at non-vegetarian meat substitute consumers. We suggest that for of a wider acceptance of meat substitutes, these products should not rely exclusively on ethical or health claims.

Acknowledgements

This study is part of the research program PROFETAS (Protein Foods, Environment, Technology And Society) and funded by the Dutch Technology Foundation STW. We would like to thank Annelies Bus for assisting in data-analysis, and Saskia Meyboom for advising on the application of the Dutch National Food Consumption Survey, 1997/1998.

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