



Portraying the sustainable consumer:

Exploring sustainable food consumption using
a lifestyle segmentation approach



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Chapter 1

General introduction



1.1. Introduction

Food production and consumption in developed countries has changed considerably over the past decades. A supply-driven system characterized by scarcity and limited choice has evolved into a demand-driven system characterized by abundance (Davies, 2001; WRR [Scientific Council for the Government Policy], 2014). Dietary patterns have changed from local, seasonal diets into diets containing food from all over the world throughout the entire year. Consumption levels of meat, fish and dairy products have raised and are still rising due to an increase in the world population and in prosperity (Ministry of Agriculture, Nature and Food quality (the Netherlands) [LNV], 2009; WRR, 2014). Demand for animal-based products is expected to increase with about 50% up to 470 million kilograms per year in 2050 (Food and Agriculture Organization of the United Nations [FAO], 2009; LNV, 2009).

These developments come along with some serious downsides. The increasing demand for animal products is associated with an increasing pressure on our ecosystem. Food production has a large negative impact on the environment due to usage of large quantities of water, soil degradation, air and water pollution and loss in biodiversity (Auestad & Fulgoni, 2015; Brinzan, Tigan, & Radu, 2012; Garnett, 2013; Reisch et al., 2013; Tukker & Jansen, 2006). In addition, contemporary food production is associated with animal welfare problems and fairness issues. All these problems can be shared under the umbrella concept of sustainability. Sustainability is a multi-faceted concept and is often defined as a combination of three dimensions: people, planet and profit. This triple bottom line refers to a social dimension of human wellbeing (people), an ecological dimension (planet) and an economic dimension of human welfare (profit) (e.g. Hammond, 2006; Van Dam & van Trijp, 2011). More specifically with regard to food, sustainability comprises environmental aspects, animal welfare issues and fair trade (Aschemann-Witzel, 2015; LNV, 2009; Reisch, Eberie, & Lorek, 2013; Van Dam & van Trijp, 2011).

The current thesis aims to provide insight into sustainable food consumption and underlying motivations for different consumer groups in order to better understand sustainable food consumption practices and contribute to a shift towards more sustainable diets. In the next section, the field of sustainable food consumption will be introduced, followed by an overview of what constitutes a sustainable diet. In addition, opportunities and barriers regarding sustainable food consumption will be outlined. In Section 1.2. relevant consumer theory will be discussed, followed by the scope and outline of the thesis in Section 1.3.

1.1.1. Sustainable food consumption

Technological progress and efficiency gains have long been viewed as the solution to sustainability problems in the food domain and are still the dominant paradigm (LNV, 2009; Lorek & Vergragt, 2015), but the role and importance of consumption levels has recently received particular attention (e.g. Assadourian, 2010; Smart, 2010; Hallström, Carlsson-Kanyama, & Börjesson, 2015; Roberts, 2009; Van Trijp & Fischer, 2011). Consumer behavior determines the sustainability of products and production systems through consumer demand (Grunert, 2011; Heller, Keoleian, & Willett, 2013; Van Trijp & Fischer, 2011). Therefore, consumers play a pivotal role in achieving more sustainable food production and consumption (Aschemann-Witzel, 2015; LNV, 2009).

Sustainable food consumption has recently become a core policy objective for national governments as well as on the international level (Annunziata & Scarpato, 2014; Auestad & Fulgoni, 2015). In 2009, for example, the Dutch government published a report in which the ambition was formulated to achieve a frontrunner position for the Netherlands in 15 years' time regarding sustainable food consumption and production. Although the focus of the report is on technological innovations and availability of sustainable products, the aim of enabling and enticing consumers towards sustainable and healthy food is explicitly mentioned. This thesis will contribute to that aim, by focusing on the essential shift in food consumption to achieve a more sustainable planet that can feed the expected 9 billion inhabitants of the globe in 2050 (FAO, 2009; LNV, 2009). If we want to achieve that aim, consumers should not only be able (have the knowledge and skills) and get the opportunity (availability of sustainable options) to choose a sustainable diet, they should also be motivated to change their consumption (Grunert, Hieke, & Wills, 2014; Rothschild, 1999). Therefore, consumer motivations regarding sustainable food will have a central position in this thesis. Before consumer motivations can be researched, it is important to understand what constitutes a sustainable diet. Therefore, in the next section a definition and explanation of sustainable diets will be given.

1.1.1.1. *What constitutes a sustainable diet?*

In stimulating consumers to shift their food consumption towards more sustainable patterns, an essential question is “what constitutes a sustainable diet?” Much debate concerning this question is going on in the scientific literature. It is outside the scope of the current research to provide a final answer to that question but the main current consensus in the literature will be used as input for this research.

The FAO defines sustainable diets as “diets protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources” (Burlingame & Dernini, 2012, p.7). This definition makes clear that sustainable diets have to fulfil a wide range of requirements that go even further than respect for humans, animals and the environment as defined by the Dutch government (LNV, 2009). According to the FAO-definition, diets can only be sustainable if consumers have access to them, can afford them and stay healthy by consuming them. In the current research, we will stick to a more narrow definition of sustainable diets, and define sustainable diets as diets that are respectful towards our planet, animals and humans (LNV, 2009). This definition enables us to gain insights in tradeoffs between sustainability and other food attributes such as price and healthiness (e.g. Grunert et al., 2014) (see also Section 1.1.1.2. and Chapter 4).

Broadly speaking, two areas of research are of interest in answering the question of what constitutes a sustainable diet. First of all, much research exists on the selection of sustainable products in terms of the production systems used. This literature mainly uses a marketing perspective and includes amongst others purchases of organic products, locally produced food, seasonal food, animal-friendly products and fair trade products. Although no consensus exists on whether, for example, organic products are more sustainable than conventional products, overall, these types of products are designated as sustainable products. Disagreement mainly comes from competing sustainability attributes, making it difficult, or even impossible, to indicate which type of product is most sustainable. For example, Fair Trade products are sustainable in terms of the equity dimension, but often require long-distance transportation and are therefore not in line with the environmental dimension of sustainability. In the current research, though, we will include organic, local, Fair Trade and animal-friendly products as sustainable products as these products are often subsumed under the sustainability definition in the literature (e.g. Annunziata & Scarpato, 2014; Hanss & Böhm, 2012; Van Dam & van Trijp, 2011).

A second relevant area of research discusses sustainable dietary patterns and focusses mainly on the product-category level. This stream of literature is closely related to the nutritional domain as it often discusses sustainability of nutritional dietary guidelines. From this literature it becomes clear that the reduction of meat and dairy consumption are the main priorities in reaching sustainable diets (Tukker & Jansen, 2006). In the western world, consensus exists about the desirability of a switch in food consumption patterns towards less animal-based and more plant-based diets. A

less animal-based diet would significantly reduce emissions, is beneficial in terms of animal welfare, and simultaneously can improve public health (Carlsson-Kanyama & González, 2009; Graça, Oliveira, & Calheiros, 2015; Health Council of the Netherlands, 2011; MacDiarmid, 2013; McMichael, Powles, Butler, & Uauy, 2007; Reisch et al., 2013; Reynolds, Buckley, Weinstein, & Boland, 2014; Van Dooren, Marinussen, Blonk, Aiking, & Vellinga, 2014; Westhoek et al., 2014). Much research is currently undertaken in the field of meat and dairy curtailment and a whole range of alternative protein sources are considered (consumption of insects, seaweed, cultured meat, etc.) (De Boer, Schösler, & Boersema, 2013; Verbeke, 2015). Another shift that would benefit sustainability is a reduction in the total number of calories produced and consumed. This reduction can be achieved in two ways. First, overweight consumers can reduce their overall calorie intake, which would simultaneously benefit their health. Second, a reduction in food waste would reduce production levels (Health Council of the Netherlands, 2011). These two streams of literature will be combined in an empirical study in Chapter 3. In addition, the dietary guideline focusing on a reduction in animal-based products will be the central focus of Chapter 6.

1.1.1.2. *Barriers & opportunities*

When asking consumers whether they value sustainability or believe sustainable food consumption is important, many answer positively. In practice though, when consumers select the food that they will consume, they often do not make sustainable choices due to perceived barriers such as high prices and unavailability (Aschmann-Witzel & Niebuhr Aagaard, 2014; Loebnitz, Mueller Loose, & Grunert, 2015). The discrepancy between consumers' expressed concern regarding sustainability and their actual choices and behaviors (or in other words, the gap between what they say and what they do) is known in the literature as the attitude-behavior gap (Gupta & Ogden, 2009; Moser, 2015; Vanhonacker & Verbeke, 2009; Van Trijp & Fischer, 2011). One explanation for this gap comes from social dilemma theory. A social dilemma is a situation that involves a conflict between immediate self-interest and long-term collective interest (Van Lange, Joireman, Parks, & van Dijk, 2013). Sustainable food consumption can be viewed as a social dilemma, because it leads to long-term, collective benefits but often conflicts (at least in the perception of consumers) with short-term individual motives (e.g. Schuldt & Hannahan, 2013). Therefore, consumers who are concerned about sustainability may not make sustainable choices because of competing short-term motives and product attributes, such as price and taste (Grunert et al., 2014). Three main sources of individual differences influence the extent to which a consumer



takes social and temporally delayed consequences into account in actual choices: social value orientation (SVO), consideration of future consequences (CFC) and trust (Van Lange et al., 2013). Social value orientation (Messick & McClintock, 1968) entails the importance one attaches to own outcomes versus others' outcomes. For example, it is known that prosocials (as opposed to proselves) are more willing to engage in proenvironmental behavior (Cameron, Brown, & Chapman, 1998; Joireman, Bennett, Richards, & Solaimani, 2001). The concept of CFC entails the importance one attaches to immediate versus distant consequences of one's actions and predicts environmental (and health) behavior (Strathman, Gleicher, Boninger, & Edwards, 1994; Van Beek, Antonides, & Handgraaf, 2013). Milfont and Gouveia (2006) showed the relevance of CFC and SVO as they found that both time perspective and social values explain environmental attitudes, and both constructs provide a unique share in the explained variance. The importance of trust can be linked to the fact that sustainability attributes are credence attributes (Fernqvist & Ekelund, 2014). Credence attributes cannot be verified even after purchase and consumption (Ford, Smith, & Swasy, 1988) and therefore the consumer has to rely on information from the supplier or on certification from an authority (Moser, Raffaelli, & Thilmany-McFadden, 2011). Both trust and the level of uncertainty about outcomes influence behavior in social dilemmas (Gupta & Ogden, 2009; Van Lange et al., 2013).

In short, the social and temporal distance of sustainability benefits form barriers for sustainable food consumption. Short-term food choice motives, such as price or taste, may overrule sustainability concerns (Insch & Jackson, 2014; Markovina et al., 2015; Moser et al., 2011; Onwezen & Bartels, 2011; Sautron et al., 2015). One way to reduce this barrier is by searching for synergies of sustainability benefits with other product attributes related to individual and/or short-term benefits (e.g. low price, taste or healthiness) (Aschemann-Witzel, 2015; Davies, 2011). This search for synergies, especially with health, will be the focus of Chapter 4. In Section 1.2. relevant consumer theories regarding sustainable food consumption will be considered.

1.2. Consumer theory

“The consumer” does not exist. Consumers are not a uniform group and every consumer has his or her own considerations in terms of importance of certain values, motives, product attributes, etc. In the past, consumers were much more homogeneous but lifestyles and behaviors have become more and more diverse (Bernués, Ripoll & Panea, 2012; Weinstein, 1987), and increasing consumer affluence led to a diversification

in customer needs and wants (Wedel & Kamakura, 2000). It is important to take consumer heterogeneity into account (Dagevos, 2005; Wedel & Kamakura, 2000), in order to better understand and influence consumer food choices. A “one-size-fits-all” approach will not be effective for the contemporary heterogeneous consumer population. One way to deal with heterogeneity is through consumer segmentation. Therefore, this thesis will include a series of segmentation studies to obtain insights into food-related motives and behaviors of a range of consumer groups. In this section, consumer theory that can help to provide these insight will be discussed. First, consumer segmentation and possible segmentation bases will be considered. Second, the value-attitude-behavior hierarchy will be outlined, followed by an overview of relevant theories. Third, measurement specificity will be elaborated upon.

1.2.1. Segmentation

Segmentation entails the identification of homogeneous subgroups within a heterogeneous consumer population (Wedel & Kamakura, 2000). Consumer segments do not naturally occur, but are artificial groupings of consumers. This implies that the identification of the segments strongly depends on the segmentation basis (the grouping variables) used to define the segments. The selection of the appropriate basis is crucial and should directly follow from the purpose of the study and ideally has a strong theoretical foundation.

Traditionally, socio-demographic variables (e.g. social class) were often used as segmentation basis (Haley, 1968; Van Raaij & Verhallen, 1994). Knowledge of socio-demographic characteristics of consumers is important in order to be able to identify consumers and to assess market potential, but the link with consumption behavior is often weak (Haley, 1968; Weinstein, 1987). It is now widely agreed that socio-demographic variables have lost much of their predicting power due to the “fragmentation” of consumers and the diversification of lifestyles (Dagevos, 2005; Grunert, Brunsø, & Bisp, 1993). Nowadays, a whole range of segmentation bases is employed. Wedel and Kamakura (2000) classify segmentation bases into general (independent of products or situations) and product-specific bases (related to the customer and product), and into observable (directly measurable) and unobservable (inferred) bases. *General observable bases* are, for example, demographics, socio-economic or cultural variables and media usage profiles (Kotabe & Helsen, 2008; Steenkamp & ter Hofstede, 2002; Wedel & Kamakura, 2000). These types of variables are relatively easy to identify, less expensive as compared to other types of segmentation bases and reliable (Kotabe & Helsen, 2008; Steenkamp & ter Hofstede, 2002; Wedel & Kamakura, 2000; Weinstein, 1987). *General unobservable*

variables are, for example, consumer values, lifestyles and personality traits (Kotabe & Helsen, 2008; Steenkamp & ter Hofstede, 2002). These variables can be grouped under the category “psychographics.” Psychographic segmentation bases are used to better understand consumer motivations (Wedel & Kamakura, 2000). Values, lifestyles and personality segments are useful in the development of effective communication because of the cognitive insights into the consumer. *Observable product-specific* variables mainly include buying and consumption behavior such as user status, loyalty or usage occasion (Kotabe & Helsen, 2008; Wedel & Kamakura, 2000). These variables are mainly measured through consumer surveys, but currently available scanner data can also provide useful data. *Unobservable product-specific* variables include product-specific psychographics, attitudes, product-benefit perceptions and importance, preferences and behavioral intentions (Kotabe & Helsen, 2008; Wedel & Kamakura, 2000). In short, food choice depends on a range of related determinants and each of these variables can be used (in isolation or in combination with other variables) as a segmentation base (Van der Zanden, van Kleef, de Wijk, & van Trijp, 2014). The selection of an appropriate segmentation base is crucial for the identification of useful and effective segments and should be theory-based (Wedel & Kamakura, 2000). To provide some structure, the wide range of relevant variables in the domain of sustainable food consumption will be categorized into three hierarchical levels in the next section. Subsequently, several consumer theories will be discussed in relation to these hierarchical levels.

1.2.2. Hierarchy of constructs

A hierarchy from values, to lifestyle (or attitudes) to actual behavior is a central assumption in many consumer behavior theories to be considered in Section 1.2.3. This hierarchy turns out to be useful in explaining environmental behavior as well as food behavior. Next, the three hierarchical levels will be explained.

1.2.2.1. Values

Schwartz (1994) defines values as “desirable transsituational goals, varying in importance, that serve as guiding principles in the life of a person or other social entity”. This definition includes five main features of values. Values are (a) concepts or beliefs, (b) about desirable end states or behaviors, (c) that transcend specific situations, (d) guide selection or evaluation of behavior and events, and (e) are ordered by relative importance (Schwartz & Bilsky, 1987). In short, values refer to desirable goals that motivate action (Schwartz, 2010). The relative importance that people place on a range of values guide any attitude or behavior (Schwartz, 2010).

Value instruments are well underpinned by theory (Steenkamp & ter Hofstede, 2002). The Schwartz value inventory (Schwartz, 1992) is often used to study the link between values and consumer behavior. Based on the work of Rokeach, Schwartz proposed a general classification of 56 values and structured these values on two dimensions: one dimension ranging from self-transcendence (social interest) to self-enhancement (personal interest), and the other from openness to change (independence) to conservationism (tradition and conformity) (Schwartz, 1992). Prior research has shown that individuals who value self-transcendent life goals tend to care more about the environment and engage more in proenvironmental behavior (Schultz & Zelezny, 2003). An important value in sustainability research is the value of universalism. Universalism is a self-transcendent value and refers to the understanding, appreciation, tolerance, and protection regarding the welfare of all people and of nature (Schwartz, 2010). Hayley, Zinkiewicz and Hardiman (2015) found that higher valuation of universalism predicts more positive attitudes towards reducing the consumption of meat and fish, whereas valuing power has a contrasting effect.

In social dilemma research, the distinction between proselves and prosocials takes a central position (Gärling, 1999; Gärling, Fujii, Gärling, & Jakobsson, 2003; Joireman et al., 2001). This distinction is comparable to the distinction between self-enhancement and self-transcendence values made by Schwartz (Gärling, 1999; Stern & Dietz, 1994). Various scholars have argued that a third value orientation should be distinguished that emphasizes the intrinsic value of nature (De Groot & Steg, 2008; Stern, 2000; Stern & Dietz, 1994; Stern, Dietz, & Kalof, 1993). Self-transcendence items can be split into a social-altruistic orientation (i.e. social justice, equality), focusing on the impact on others, and a biospheric value orientation (i.e. protecting the environment, a world at peace), focusing on the impact on the ecosystem or the biosphere (De Groot & Steg, 2008). Proenvironmental beliefs, intentions and behavior appear to be positively related to social-altruistic and/or biospheric values and negatively to egoistic values (see De Groot & Steg, 2008). De Groot and Steg (2008) have developed an instrument to measure egoistic, altruistic and biospheric value orientations in the domain of proenvironmental behavior. The value instrument is useful in better understanding relationships between values, beliefs and intentions.

1.2.2.2. Lifestyle

Lifestyle research became popular due to the weak correlation of personality characteristics and specific consumer behavior (Van Raaij & Verhallen, 1994) and is now one of the most popular segmentation bases in the literature (Wedel & Kamakura,



2000). Although demographics describe *who* consumes, lifestyle variables are crucial in understanding *why* consumers consume (Dagevos, He, Zhang, van der Lans, & Zhai, 2011; Solomon, Bamossy, & Askegaard, 2002). Lifestyles are more closely related to behavior than, for example, people's values (Vinson, Scott, & Lamont, 1977). The insights into motivations underlying observed behavior that lifestyle research provides help to explain consumer behavior (Van Raaij & Verhallen, 1994; Weinstein, 1987). Lifestyle, though, is a difficult concept and is often criticized for the lack of a clear definition and a lack of theoretical underpinning (Anderson & Golden, 1984; Steenkamp & ter Hofstede, 2002). Lifestyles are not helpful in understanding consumer behavior if lifestyle variables are not based on theory and have no clear casual relationships to other types of variables (Anderson & Golden, 1984). Therefore, we place lifestyles in a hierarchy between values and behavior, in accordance with Brunsø, Scholderer and Grunert (2004).

Lifestyle is commonly defined as a combination of (1) characteristic patterns of overt behavior reflecting the type of activities that one is involved in and how much time and money one spends on them (Antonides & van Raaij, 1998; Solomon et al., 2002), and (2) cognitive processes and properties (cognitive style), including values, attitudes, involvement, opinions, beliefs and interests (Anderson & Golden, 1984; Antonides & van Raaij, 1998; Solomon et al., 2002). Anderson and Golden (1984) criticize the combination of overt behaviors and cognitive style in one lifestyle construct, because of the non-congruence between cognitions and behavior. They therefore propose to limit the definition of lifestyle to overt behavior, but we draw the opposite conclusion (in accordance with Grunert et al., 1993) and define lifestyle in terms of cognitive style, which is closer to the way the lifestyle concept is used in the literature (Anderson & Golden, 1984; Grunert et al., 1993). Lifestyle here is defined as one's characteristic pattern of thinking and perceiving, which mediates between values and overt behavior. A lifestyle can be seen as an expression of one's values in one's daily life (Steenkamp & ter Hofstede, 2002).

Defined in this way, lifestyle includes a wide range of cognitive constructs. A few of these constructs deserve special attention here, because they will have a central role in some of the following chapters: food choice motives, attribute importance and perceptions. These three concepts are often used interchangeably (e.g. Onwezen et al., 2012) because they are closely related to each other (Van der Zanden et al., 2014). A consumer is trying to satisfy a need, and when this need becomes sufficiently pressing to drive the person to act it may be called a motive (Kotler, 2002). Food choice motives are fulfilled by product benefits (Kotler, 2002). "Product benefits are the interaction of

product consequences with domain-specific variables” (Van Raaij & Verhallen, 1994, p.62). In seeking certain benefits, the consumer sees a product as a bundle of attributes with varying abilities to deliver the benefits and satisfy the need (Kotler, 2002; Van Raaij & Verhallen, 1994; Weinstein, 1987). Therefore, product attributes lead to benefits that are more or less important to consumers depending on their values (Kotler, 2002; Van Raaij & Verhallen, 1994). Purchase behavior depends on the importance consumers attach to each of the attributes and on attribute perceptions (Wedel & Kamakura, 2002). A motivated person is ready to act, but how the person actually acts is influenced by his or her perception of the situation (Kotler, 2002). “Perception is the process by which an individual selects, organizes and interprets information inputs to create a meaningful picture of the world” (Kotler, 2002, p.94). Product attributes are sometimes related in the perception of consumers. Organic or Fair Trade products are often perceived as both healthier and as less tasty, for example (Schuldt & Hannahan, 2013; Schuldt, Muller, & Schwarz, 2012; Schuldt & Schwarz, 2010). Based on these motives and perceptions, the consumer forms preferences for a certain product and forms an intention to buy the most preferred product.

1.2.2.3. Behavior

Broadly, two types of behavior can be identified: product acquisition (or buying behavior) and product usage (or consumption). Kotler developed a model to understand buyer behavior. He argues that stimuli enter the black box of a consumer’s mind, in which a transformation process occurs leading to a response (purchase or no purchase). In the “black box”, a decision making process takes place, starting with problem (need) recognition, followed by information search, evaluation of alternatives, leading to a decision. These stages are influenced internally by motivations, perceptions, learning, beliefs and attitudes (Kotler, 2002) (see Section 1.2.2.2.). Product usage entails the frequency of consumption. Consumers can, for example, be categorized as light vs medium vs heavy users (Weinstein, 1987).

1.2.3. Theories related to the hierarchy of constructs

Several authors have argued for a value-lifestyle-behavior hierarchy in which values affect lifestyle variables such as product evaluations, benefits or attitudes, which then influence behavior (Homer & Kahle, 1988; Milfont, Duckitt, & Wagner, 2010; Rokeach, 1973; Vinson et al., 1977; Wedel & Kamakura, 2000). Milfont et al. (2010), for example, show that environmental attitudes fully mediate the influence of altruistic and self-enhancement values on ecological behavior. Homer and Kahle (1988) also



found a hierarchical model from values to attitudes to shopping behavior in the context of natural-food consumers. In the following, a number of relevant theories will be considered briefly, including means-end chain theory, Theory of Planned Behavior, the Norm Activation Model, value-belief-norm theory, the food-related-lifestyle model, and the conceptual model of the food choice.

Means-end chain theory. A relevant theory to study the relation between values and behavior is the means-end chain theory (Costa, Dekker, & Jongen, 2004; Gutman, 1982; Reynolds & Gutman, 1988), where consequences intervene between values (end) and products (means) (Wedel & Kamakura, 2000). Means-end chain theory argues that consumer choice behavior is triggered by how products are linked to self-relevant higher-order cognitive categories (values or utilities). At an intermediate level, psychosocial and functional consequences, and abstract and concrete product attributes are distinguished (Grunert et al., 1993; Olsen & Reynolds, 1983; Van Raaij & Verhallen, 1994).

Theory of Planned Behavior. Another relevant and widely adopted theoretical framework in understanding food consumption is the Theory of Planned Behavior (TPB) (Ajzen, 1991; Conner & Armitage, 2006; Gorton & Barjolle, 2013). The TPB is a rational consumer behavior model and is based on the belief that behavioral intentions are the immediate predictors of behavior. Intentions, in turn, are influenced by three factors: someone's attitude towards the behavior, how much social pressure one feels (subjective norm) and whether the person feels in control to perform the behavior (perceived behavioral control) (Ajzen, 1991; Gorton & Barjolle, 2013). The perceived behavioral control (PBC) is also a direct determinant of behavior. PBC incorporates internal control factors such as information, skills and abilities as well as external control factors such as dependence on others or situational factors (Gorton & Barjolle, 2013). In general, these three determinants predict behavioral intentions and behaviors reasonably well (Armitage & Conner, 2001). The TPB has been extended with several variables to be better able to predict sustainable consumption. For example, Ozcaglar-Toulouse, Shiu and Shaw (2006) applied the TPB, extended with ethical concerns, self-identity and ethical obligation (similar to Shaw, Shiu, & Clarke, 2000) to include ethical and social aspects. Aertsens, Verbeke, Mondelaers and van Huylenbroeck (2009) used the TPB in the context of organic food consumption, linked it to Schwartz values theory and added affective attitudes, emotions, personal norms, involvement and uncertainty.

Norm Activation Model. Onwezen, Antonides and Bartels (2013) combined the TPB with the Norm Activation Model and anticipated emotions in order to predict purchase of environmentally-friendly products (mainly food products). The

basic premise of the Norm Activation Model (NAM) (Schwartz, 1977) is that moral or personal norms are direct determinants of prosocial behavior (Bamberg & Möser, 2007; Schwartz, 1977). Although the NAM was originally developed in the context of altruistic behavior it also explains environmentally-friendly behavior (Onwezen et al., 2013). Personal norms form the core of the NAM and predict behavior (Schwartz, 1977). Schwartz (1977) states that these norms are actively experienced “as feelings of moral obligation, not as intentions” (p. 227). The model states that these personal norms are determined by two factors: the awareness of consequences of performing the specific behavior, and the feeling of responsibility for performing the behavior (Onwezen et al., 2013; Schwartz, 1977).

Value-belief-norm theory. The value-belief-norm theory (VBN) (Stern, 2000) links value theory to the norm-activation theory. It assumes that moral or personal norms (a person’s sense of obligation) predict conservation behavior. Personal norms, in turn, are determined by a chain of three types of beliefs: one’s perceived ability to reduce the threat; one’s awareness of the consequences of the behavior and one’s ecological worldview. The ecological worldview is influenced by one’s biospheric, altruistic and egoistic values (Stern, 2000).

Food-related lifestyle model. Next to these more general models, domain-specific food models can help understanding the value-lifestyle-behavior hierarchy in sustainable food consumption. The food-related lifestyle (FRL) construct has been developed based on a means-end chain perspective. In the FRL-model, lifestyle is defined as a mediating concept between abstract values and concrete perceptions and behavior (Brunso & Grunert, 1995; Brunso et al., 2004; Grunert, 1993; Grunert et al., 1993; Grunert, Brunso, & Bisp, 1997). Five key components of lifestyle have been identified: higher-order product attributes, meal preparation scripts, shopping scripts, usage situations and desired consequences.

Conceptual model of the food choice process. A final relevant domain-specific model has been developed by Furst, Connors, Bisogni, Sobal and Falk (1996). In this conceptual model of the food choice process, people’s life courses underlie many factors that shape food choice. A life course is formed by culture and upbringing and includes ideas and information acquired through past experiences, as well as hopes, fears and expectations for the future. Life courses affect determinants of food choice. Furst et al. (1996) call these determinants “influences”, and further distinguishes ideals (e.g. expectations, beliefs and social status), personal factors (e.g. likes/dislikes, food involvement, socio-demographic variables or health status), resources (e.g. money, skills, knowledge and time), social framework (e.g. social roles or interpersonal relationships)

and the food context (e.g. availability). These determinants, in turn, lead to the development of personal systems for making food choices. The personal system forms the core of the model and includes value negotiations as well as behavioral strategies. Value negotiations are very dynamic and represent the trade-offs consumers make when purchasing food. Sensory perception, monetary evaluations, convenience, health and nutrition, quality and managing relationships are identified as the most important values, but ethics, tradition and familiarity can also play a role. The different values can be in harmony but can also conflict, and therefore trade-offs have to be made (Furst et al., 1996). Consumer perceptions of price, sensory characteristics, quality, available resources, etc. are crucial in balancing the different values, rather than the objective reality. These value negotiations can be seen as the weighted importance of a range of food choice motives, such as developed in the Food Choice Questionnaire (Step toe, Pollard, & Wardle, 1995) and extended with ethical motives by Lindeman and Väänänen (2000). Behavioral strategies are more like routines and involve habitual choice patterns based on previous trade-offs and are often related to certain situations. Value negotiations and/or strategies lead to the ultimate food choice (Furst et al., 1996).

An overview of the relevant constructs from the theories considered above, categorized into three hierarchical levels, is depicted in Figure 1.1. The most abstract level includes time orientation and socio-demographic characteristics next to values and has therefore been labelled as “personal characteristics.” The intermediate level includes attitudes, but also a wide range of other cognitive variables and is labelled as “lifestyle”. The bottom level includes product choices and dietary patterns and has been labelled “behavior”. This hierarchy of constructs will be used as a broad framework throughout this thesis and will be discussed in Chapters 2, 4 (partly) and 7. Within these hierarchical levels, the specificity of the operationalization of the items should be considered. This level of specificity will be elaborated upon in the next section.

1.2.4. Levels of specificity

In the value-lifestyle-behavior hierarchy, values are generally most abstract and behaviors are most concrete. However, it is important to recognize that within these hierarchical levels, the variables can be operationalized at different levels of abstraction (Van Raaij & Verhallen, 1994). Broadly, general, domain-specific, and (product) specific variables can be distinguished (Bartels & Reinders, 2011; Goldsmith, Freiden, & Eastman, 1995; Grunert, 2006; Van Raaij & Verhallen, 1994; Van der Zanden et al., 2014; Verain et al., 2012). Variables on the general level include stable behavioral patterns and personal characteristics such as personality, lifestyle and values. General variables are stable and

permanent characteristics of consumers. Segments based on general variables apply to many products and services. Domain-specific variables relate to domains of behavior, defined as “a set of behaviors with a common goal, consequence or outcome” (e.g. eating) (Van Raaij & Verhallen, 1994, p.50). Substitution and complementarity of behaviors are characteristics of a domain (Van Raaij & Verhallen, 1994). At the specific level, variables related to brand usage or specific behaviors are included. Segments based on specific variables give information on brand-attribute evaluations, for example, and are relevant to product managers (Van Raaij & Verhallen, 1994). Van Raaij and Verhallen (1994) argue that both product evaluations (cognitive variables comparable to our personality and lifestyle categories) and behaviors can be measured on a general, a domain-specific and a specific level.

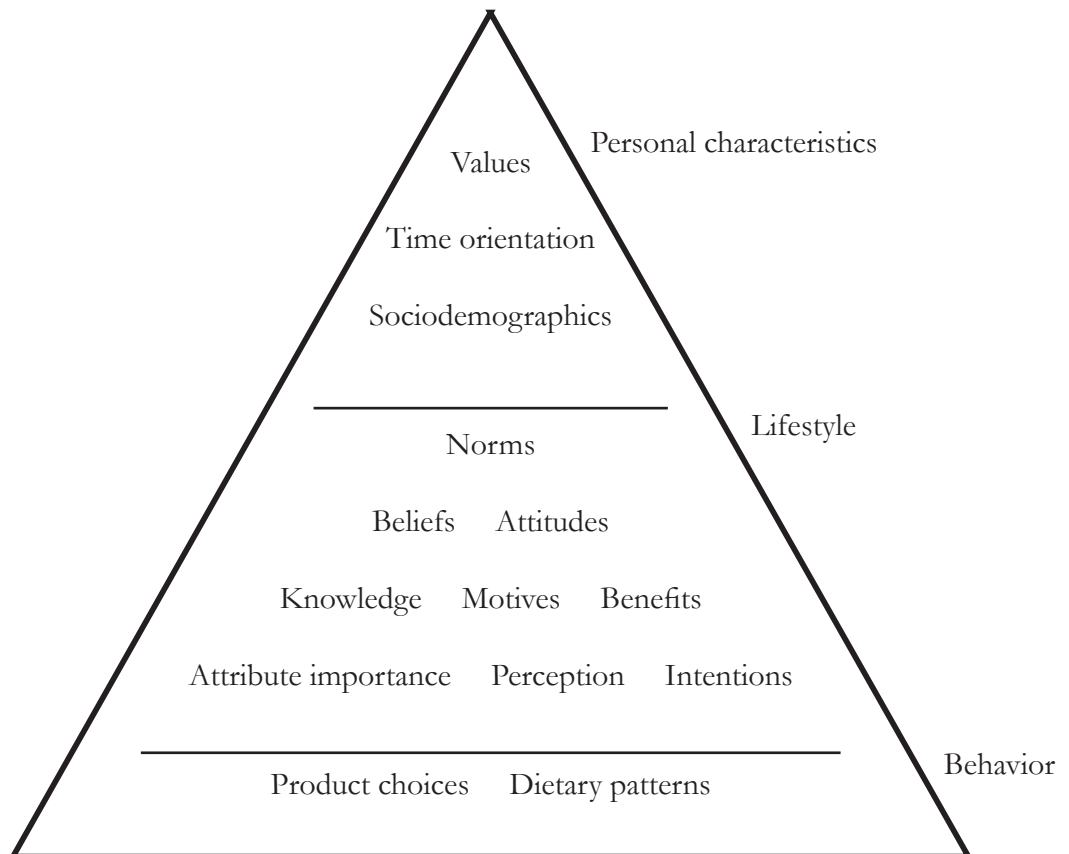


Figure 1.1. Hierarchy of constructs.

Regarding evaluations, at the specific level, attributes can be evaluated in terms of favorability, according to the model of Fishbein and Ajzen (1975). Domain-specific evaluations are related to the consequences or benefits of using the product. General evaluations are independent of concrete objects and more stable and permanent than domain-specific variables (Van Raaij & Verhallen, 1994). Regarding behavior, the same three levels can be distinguished: single acts on the specific level, behavioral categories on the domain-specific level and behavioral patterns on the general level (Van Raaij & Verhallen, 1994).

In researching sustainable food consumption, a fourth level of specificity can be of added value. As mentioned in Section 1.1.1.1., the main shift that should be promoted to make current food consumption levels more sustainable is a reduction in meat and dairy products. This shift implies a change at the product-category level. Within a domain, several product categories can be identified (Van Raaij & Verhallen, 1994). A product category can be defined as “a set of products and product types that have the same or similar functions. These products are substitutes for each other. Product classes may also be complementary within a domain.” (Van Raaij & Verhallen, 1994, p.61).

Literature shows the importance of measuring lifestyle variables and behavioral variables at the same level of abstraction in order to maximize explanatory power (Hustad & Pessemier, 1974; Kaiser, Wölfing, & Fuhrer, 1999; Van Raaij & Verhallen, 1994; Weigel & Newman, 1976). General attitudes predict generalized behavioral patterns and specific attitudes predict specific behaviors (Van Trijp & Fischer, 2011). This principle is called the principle of correspondence and is a way to increase the explanatory power of lifestyle variables (Van Trijp & Fischer, 2011). For example, if vegetable consumption is the dependent variable and attitudes and perceptions are included as predictor variables, the attitude and perceptions should best be formulated at the level of vegetables and not for food in general. The importance to select the appropriate level of specificity is underpinned by the research of Grunert, Hieke and Wills (2014) who found that respondents express medium to high levels of sustainability concerns at the general food level, but low levels of concern on the product-category level.

The same reasoning goes for segmentation. General lifestyle segmentation is likely to identify factors that influence general behavior patterns rather than any specific behavior (Wedel & Kamakura, 2000). It has not been proven that general lifestyle segments have relatively homogeneous patterns of consumer behavior, resulting in low predictive power in explaining specific behavior. A way to overcome this problem is

by domain-specific lifestyle segmentation in which variables that are relevant to the domain of consumption (e.g. food) are included in the research (Solomon et al., 2002). The combination of general and product-specific lifestyle items is likely to produce segments that are closely related to specific consumer behavior (Wedel & Kamakura, 2000).

An interesting theory that relates to measurement level is construal level theory (CLT), developed by Liberman, Trope and Wakslak (2007). Key in this theory are different levels of representation, from specific or concrete to general or abstract (Rontelap, Sijtsema, Dagevos, & de Winter, 2012). CLT argues that consumer decisions depend on how they psychologically construe what the decision is about. People tend to represent close objects at a lower abstraction level (concrete), and distant objects at a higher abstraction level (abstract) in terms of spatial, temporal, hypothetical or social distance (Liberman et al., 2007). In the sustainability context, asking people about their cognitions regarding sustainability would lead to a high construal level (Van Trijp & Fischer, 2011). People would then be more likely to base their judgements on abstract criteria, including their moral principles (Eyal, Liberman, & Trope, 2008). Concrete behavior, however, is more likely based on concrete and specific aspects (Van Trijp & Fischer, 2011). This, again, points to the importance of carefully considering the level of abstraction on which (lifestyle) variables are operationalized in order to increase predictive power. It is important to notice though, that the level of specificity on which consumers interpret (food) aspects may differ between individuals and between products (see Rontelap et al., 2012 for a study on health representations at different levels of specificity).

1.3. Overview of the thesis

The overall aim of this research is to identify and provide insights into consumer segments regarding sustainable food consumption. The aim for a better understanding of sustainable food consumption, considering the diversity of contemporary consumers, has led to the formulation of the following central research questions:

- Which consumer segments can be identified in the domain of sustainable food consumption by using a range of product-category-specific food segmentation bases?

- How do these segments relate to personal, lifestyle and behavioral variables that are relevant to the food domain?

By answering these questions, this thesis will provide useful insights and thereby will contribute to developing policies to achieve more sustainable food consumption levels.

The focus of the current research will be on consumer lifestyles regarding sustainable food consumption. The previous sections have made clear the importance of lifestyle segmentation in order to obtain a better understanding of why consumers (do not) behave sustainably, because those performing similar behaviors can do so out of different reasons. Consumers have become more and more diverse in their wishes and choices because of the increase in welfare. This diversity in lifestyles should be taken into account in researching sustainable consumer behavior. In literature, it has been argued that the intermediate level in the hierarchy of construct, the level of lifestyle, is useful as a segmentation basis (Grunert et al., 1993; Haley, 1968). Lifestyle aspects such as benefits are causal factors and are therefore helpful in predicting future consumption (Haley, 1968). Descriptive variables such as demographics or consumption volumes are more useful in profiling the identified segments (Haley, 1968).

The measurement specificity that will be used for the segmentation variables is the domain-specific level. In the literature, there has been a plea to choose for a middle level of specificity. The domain-specific level is the most feasible segmentation level, providing the most meaningful results (Van Raaij & Verhallen, 1994; Grunert et al., 1993), as it is a useful compromise between too abstract operationalizations that are not applicable in practice and too concrete operationalizations that are only useful in very specific contexts. General variables do not correlate sufficiently with specific behavior, whereas domain-specific variables do (Van Raaij & Verhallen, 1994). Van Raaij and Verhallen (1994) recommend the usage of domain-specific values and behaviors as segmentation basis and general and specific variables as profiling variables to describe the consumers in the identified segments.

Within the domain-specific level, a further specification can be made regarding product categories (Van Raaij & Verhallen, 1994). As outlined in Section 1.2.4. measurement correspondence is important for the predictive power of lifestyles on behaviors (Van Raaij & Verhallen, 1994). In improving sustainability of contemporary diets, a shift from certain product categories (meat and dairy) to others (plant-based categories) is essential (see Section 1.1.1.1) and therefore, insights will be gained on the product-category level in this thesis in order to better understanding sustainable behavior.

A disadvantage of lifestyle segmentation that is often mentioned in the literature is the lack of a theoretical foundation (Grunert et al., 1997). Therefore, in this research, lifestyles have been placed in a hierarchy of constructs (see Figure 1.1.) based on a range of relevant consumer behavior theories. In addition, the literature makes clear the importance of measurement correspondence between lifestyle variables and behavioral variables. In Figure 1.2., an overview of the relevant theories is shown in which the hierarchy of constructs (vertical axis) and the levels of specificity (horizontal axis) are integrated. The theories are represented on the hierarchical level and the level of specificity on which they operate. Construal level theory involves the level of abstractness or concreteness on which certain constructs are represented and is therefore situated on the horizontal axis of level of specificity. Means-end chain theory, in contrast, focusses on a hierarchy of constructs from values to consequences to product attributes and is therefore situated on the vertical axis. The food-related lifestyle model and the conceptual model of the food choice process by Furst also include constructs on the three hierarchical levels, but the FRL-model is domain-specific for food and the model by Furst et al. (1996) is more focused on individual product choices. The operationalization of the FRL-model, though, can be made more concrete in order to include product-level measurements or even product measurements. The model of Furst can apply to the product-category level or the food domain as well. Value theory and consideration of future consequences focus on general personal characteristics. VBN and NAM include values as well as lifestyle variables and can be operationalized on all specificity levels. Finally, TPB predicts behavior based on lifestyle variables and can be operationalized on the domain-specific, product category or product-specific level.



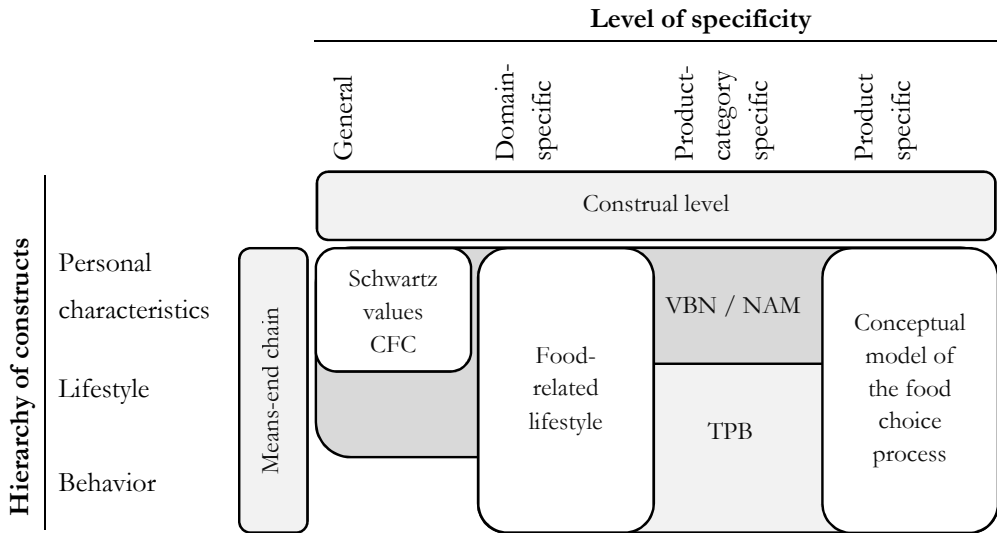


Figure 1.2. Overview of the relation between theories, the hierarchy of constructs and the level of specificity.

Figure 1.2. forms the basis of all chapters in this thesis. Each of the chapters will investigate a range of variables in relation to sustainable food consumption. Some chapters are more focused on behavior (Chapter 3), others on lifestyle variables (Chapters 4, 5 and 6), but all chapters include measurements at the domain-specific and product-category levels. This **introduction chapter** outlines the societal, theoretical and methodological context in which the thesis research should be placed. A first question that should be asked in researching sustainable consumer segments is whether they exist at all and how we could identify these segments. Therefore, **Chapter 2** provides a literature review of existing segmentation studies regarding sustainable food. This chapter provides insights into the type of variables that are used in these studies, and that are useful to identify and profile consumer segments. In addition, this chapter describes three general segments that are often found in sustainable food segmentation studies.

The next three chapters describe three segmentation studies at the product-category level, in order to identify consumer segments in the sustainable food domain. **Chapter 3** includes a segmentation in which behaviors at the product-category level are used as segmentation basis. Food segments could not only differ in their level of sustainable food consumption or the extent to which sustainability forms an essential part of their lifestyle; it is also possible that consumers differ in the type of sustainable food behaviors they perform. One way to differentiate sustainable behaviors is in the aspect of sustainability (environmental problems, animal welfare issues, or fair trade). Another possible distinction is between sustainability of production methods of the foods that are consumed and the sustainability of the dietary pattern. Chapter 3 gains empirical insight into this last distinction, between sustainable product choices and curtailment of consumption in unsustainable product categories. These two types of sustainable consumption are often researched separately but are now empirically distinguished. Predictors of these two types of behaviors are identified. In addition, consumer segments are identified based on these two types of sustainable behaviors.

Although it is important to obtain insights into the types and levels of sustainable food consumption, we do not only want to know who is behaving sustainably and how, but more interestingly, we want to know why they behave like they do. Without knowing the why, it is difficult to make people change their behaviors. **Chapter 4** focuses on the “why” of food behaviors and gains additional insights into sustainable food consumption by investigating the importance of product-category attributes. Segments are identified based on importance ratings of sustainability attributes, as well as taste, price and health. An additional focus of Chapter 4 is the link between sustainability and health. From the literature it is not clear whether health and sustainability motives and perceptions go hand in hand in different consumer segments. The identified segments are related to concrete sustainability and health perceptions in order to search for synergies that can be used in stimulating sustainable consumption.

Chapter 4 makes clear that product-category measurements are relevant in studying sustainable food lifestyles, but in segmenting consumers product-category differences disappear. Therefore, in **Chapter 5** the most important product category regarding sustainable food patterns, namely meat, will be further investigated. A reduction in meat consumption is crucial in achieving sustainable diets. Insights are gained in consumer segments that differ in their meat-related lifestyles as well as in their level of meat consumption.



Chapter 6 extends the findings of Chapter 4. The same segmentation basis is used, but additional personal characteristics deepen our insights into the identified segments. An experiment is conducted in order to test the segments for their responsiveness to dietary messages that differ in focus on health and sustainability arguments for a less animal-based diet. In the closing **discussion chapter**, the main findings and their implications are discussed. The thesis chapters are a collection of published and submitted journal articles (Chapters 2, 3, 4, and 6) and a book chapter (Chapter 5). Therefore, Chapters 2 to 6 can be read independently, but they overlap to some extent¹.

¹ Some differences exist in terminology across chapters. Clusters and segments have been used interchangeably. In addition, act-related and product-related behaviors refer to the same concepts as curtailment and sustainable product choices (or sustainably produced product). Because some of the Chapters have already been published, we did not want to change the wording in order to make it consistent.



Chapter 2

Segments of sustainable food consumers: A literature review



This chapter is published as:

Verain, M. C. D., Bartels, J., Dagevos, H., Sijtsma, S. J., Onwezen, M. C., & Antonides, G. (2012). Segments of sustainable food consumers: a literature review. *International Journal of Consumer Studies*, 36(2), 123-132.

Abstract

Sustainable food consumption is an important aspect of sustainable development. When adopting a sustainable food-lifestyle, consumers are confronted with complex choices. Today's food consumption is too complex to be explained by socio-demographic factors exclusively. A broader perspective is needed. In order to explain behavior across different consumer segments better, relatively homogenous segments of food consumers were identified by segmenting food consumers based on a wide range of variables. The current study aims to provide an overview of published studies that have segmented consumers with regard to sustainable food consumption. The literature review has been conducted by searching SciVerse Scopus for all relevant articles available until November 2010. The main criterion for including a specific study was the inclusion of empirical analyses of primary data, resulting in consumer segments with regard to sustainable food consumption. Sixteen articles were incorporated in the final analysis. First, the variables used for segmentation and profiling in the included articles have been categorized into three levels of abstraction: personality characteristics, food-related lifestyles and behavior. The three levels of abstraction proved to be helpful in categorizing the segmentation studies. The findings indicate that variables on all three levels were efficient in differentiating consumer segments regarding sustainability. In addition, the importance of price and health differed across the segments, although these variables are only indirectly related to sustainability. Second, the three most frequently identified consumer segments with regard to sustainable food consumption were: "greens," "potential greens" and "non-greens." These segments differed from one another on all three levels of abstraction. This implies that future segmentation studies should include variables on all levels of abstraction to get a complete picture of existing sustainable consumer segments. Marketers should be aware that targeting specific segments based on socio-demographic variables exclusively, is not sufficient. Personality characteristics, lifestyle and behavior are all important to take into consideration. Attempts at stimulating sustainable consumption might be most effective when differences across consumer segments are taken into account. Future research is needed to explore the characteristics of different sustainable food consumer segments with respect to their potential contributions in promoting sustainable development.

2.1. Introduction

Sustainable food consumption is becoming more urgent with every passing year. Global food production and consumption leaves an ever-increasing carbon, water and ecological footprint¹. It is clear that technological innovations are required to reduce this “foodprint” (e.g. more sustainable meat substitutes, more efficient (organic) production processes, reduction in water and energy use and more efficient transportation processes). Although technological progress and increasing the efficiency of food supply processes remain very important, the role and importance of consumption has received particular attention recently (e.g. Assadourian, 2010; Roberts, 2009; Smart, 2010; Spaargaren & Oosterveer; 2010, Van Trijp & Fischer, 2011). Consumption is no longer seen as a phenomenon that contradicts sustainability. Sustainable consumption is considered an important aspect of sustainable development, particularly in contemporary western societies (Abeliotis Koniari, & Sardianou, 2010). Together with technological innovations, changes towards more sustainable consumption patterns should be part of the solution to the sustainability problem (De Bakker & Dagevos, 2012). Thus, it is important to analyze and categorize in what ways and to what extent food consumers can contribute to a more sustainable world.

In the last few decades, a large number of studies on sustainable food consumption have been reported. Sustainable food consumption covers a wide variety of topics, including the environment, animal welfare and Fair Trade (e.g. Barr & Gilg, 2006; Grunert & Juhl, 1995; Lockie, Lyons, Lawrence, & Mummary, 2002; Raynolds, 2002). Studies regarding environmentally friendly food choices are especially conducted with a focus on organic food products (Grunert & Juhl, 1995; Janssen, Heid, & Hamm, 2009; Saba & Messina, 2003). Studies pertaining to animal welfare are particularly related to the living conditions and health of the animals (Hansen, Holm, Frewer, Robinson, & Sandøe, 2003; Verbeke, van Oeckel, Warnants, Viaene, & Boucqué, 1999), whereas Fair Trade (Raynolds, 2002) focuses on fair prices for goods and services, decent working conditions, and a commitment from buyers to ensure reasonable security for the producers (FLO, 2011).

¹ The carbon, water and ecological footprint are defined in accordance with the Barilla report: The carbon footprint measures greenhouse gas emissions, the water footprint quantifies the amount of water resources used and the ecological footprint ‘measures the biologically productive land and sea area human activity requires to produce resources it consumes and to absorb the waste it generates’ (Barilla Center for Food and Nutrition, 2010).

Following Rozin (2007) who speaks about “the frightening complexity of food choice,” we state that, particularly in wealthier societies, consumers’ food considerations are very complex. More specifically, when adopting a more sustainable lifestyle, consumers are confronted with complex choices as a result of possible conflicting interests between individual objectives and long-term collective goals (Van Strien & Koenders, 2012). As a consequence, today’s food consumption cannot exclusively be explained by socio-demographic factors, such as income and age, but needs a broader socio-cultural and social-psychological perspective (Dagevos, 2005; Diamantopoulos, Schlegelmilch, Sinkovics, & Bohlen, 2003). In this regard, the concept of food-lifestyles provides perspective in addition to socio-demographic characteristics. In the mid-1990s, Brunsø and Grunert first introduced the concept of food-related lifestyle (FRL) (Brunsø & Grunert, 1995; Grunert, Brunsø, & Bisp, 1997). They defined lifestyle as the system of cognitive categories, scripts and their associations, which relate a set of products to a set of values (Brunsø & Grunert, 1995). Brunsø and Grunert place lifestyles in a hierarchy of constructs of different levels of abstraction. Lifestyles are placed at an intermediate abstraction level between abstract values and concrete products or brand perceptions and attitudes. Lifestyle transcends individual products, but may be specific to a product class. Brunsø and Grunert developed a domain-specific lifestyle instrument to measure food-related lifestyles, consisting of five domains (ways of shopping, cooking methods, quality aspects, purchasing motives and consumption situations) (Brunsø & Grunert, 1995; Grunert et al., 1997).

To direct marketing efforts or public campaigns to consumers with differing food-lifestyles, it is important to identify homogenous consumer groups by segmenting consumers into different clusters (Gil, Gracia, & Sánchez, 2000; Green, Carmone, & Wachspress, 1976; Wedel & Kamakura, 2002; Grunert, Brunsø, Bredahl, & Bech, 2001). In contrast to the vast number of consumer studies regarding sustainable food choices, far less research has been conducted on consumer segmentation and sustainable food choices. Therefore, the current study aims to provide guidance for future segmentation studies by giving an overview of consumer segmentation studies regarding sustainable food consumption. The variables used in the segmentation studies herein reviewed are categorized in accordance with Brunsø, Scholderer, and Grunert (2004), who state that lifestyles mediate between abstract goal states and behavior. In this regard, three levels of abstraction have been distinguished: personality characteristics, food-related lifestyles and behavior.

The use of three levels of abstraction, from very abstract to very concrete, is common in several domains and seems to be valuable in explaining consumption behavior. For example, Goldsmith, Freiden and Eastman (1995) have presented and tested a psychological model of the relationships between personality and overt behavior that are mediated by domain-specific variables. More recently, Bartels and Reinders (2011) have developed a model that proposes three levels of conceptualization and operationalization to explain consumers' innovative behaviors (innate, domain-specific and actual behaviors).

In this review, three levels of abstraction will be used to classify variables used in the sustainability literature to segment food consumers and to profile these segments. Furthermore, this study will describe which overall consumer segments are distinguished across sustainable food segmentation studies and will give insight into the variables that distinguish and describe these consumer segments.

2.2. Method

This literature review of food consumer segmentation studies has been conducted by searching SciVerse Scopus for all relevant articles available until November 2010. Articles were selected if the employed search terms appeared in the topic section of the database or in the keywords, title, or abstract of the article under consideration. The following search terms were used:

- “food” (in the whole document);
- “consum*” (in the title, abstract, or keywords);
- “green” or “sustainab*” or “ethical behavior” or “fair trade” or “environment*” or “organic” or “animal welfare” or “animal friendly” or “ethic*” or “ecol*” or “social responsibility” or “corporate social” (in the title); and
- “consumer segment*” or “segmentation” or “cluster analysis” (in the title, abstract, or keywords).

The database search resulted in 133 abstracts. These abstracts were analyzed and judged for relevance by two independent researchers. The main criterion for including a specific study was the inclusion of empirical analyses of primary data, resulting in consumer segments or clusters. Sixteen articles on consumer food segmentation and sustainability were incorporated in the final analysis. An overview of the sixteen selected articles can be found in Table 2.1.



Table 2.1. Overview of the sixteen selected articles.

Authors	Year	Country	# of respondents	# of segments	Segments
1 Bernabéu et al.	2008	Spain (Castilla-La-Mancha)	400	3	1 Price 2 Origin 3 Price and type
2 Chryssohoidis & Krystallis	2005	Greece	205	4	1 Health conscious 2 Organic loyal 3 Explorers 4 Independents
3 D'Souza et al.	2006	Australia	155	2	1 Environmentally green consumer 2 Price sensitive green customer
4 Deliza et al.	1999	United Kingdom	123	2	1 Price 2 Production method
5 Fraj & Martinez	2006	Spain	573	4	1 Fashion 2 Adventurous spirit 3 Leader 4 Knowledge
6 Gil et al.	2000	Spain (Navarra and Madrid)	400	3 and 4	Navarra: 1 Likely consumers 2 Organic food consumers 3 Unlikely consumers Madrid: 1 Unlikely mature consumers 2 Unlikely young consumers 3 Likely consumers 4 Organic food consumers
7 Grunert & Juhl	1995	Denmark	174	2	1 Greens 2 Whites
8 Honkanen & Olsen	2009	Spain	450	3	1 Unconcerned 2 Wild fish concerned 3 Ambivalent

9	Jain & Kaur	2006	India	206	1*	1 Green consumers
10	Janssen et al.	2009	Germany	149	4	1 Organic buyers 2 Additive avoiders 3 Concerned about animal welfare 4 Conventional buyers
11	Kihlberg & Risvik	2007	Sweden	184	2	1 Age 30+ 2 Age 30-
12	Mostafa	2009	Kuwait	418	4	1 True-greens 2 Reluctant greens 3 Basic browns 4 Potential greens
13	Saba & Messina	2003	Italy	947	3	1 Cluster 150** 2 Cluster 223 3 Cluster 574
14	Tivadar & Luthar	2005	Slovenia	1147	6	1 Male traditionalists 2 Yes-sayers 3 Male modernists 4 Weight watchers 5 Carefree hedonists 6 Health-conscious hedonists
15	Walley et al.	2000	United Kingdom	300	4	1 Panlossians 2 Angries 3 Not quite-so-angries 4 Anxious-but-amiable
16	Yue et al.	2010	Germany	260	3	1 Industry-trusting group 2 Healthy diet-oriented group 3 Price-oriented group

Note. *Jain & Kaur investigated a green segment but did not compare it to another segment.

Note. ** No cluster names have been given. The numbers indicate cluster sizes.



2.3. Results

First, an overview is given of the variables that have been used in the 16 studies reviewed herein. The first section focuses on socio-demographic variables. The remaining variables are categorized and presented in the following three sections, which reflect the three levels of abstraction: personality characteristics, food-related lifestyles and actual behavior. In each section, we distinguish between segmentation variables and profiling variables. The second part of the results presents the most commonly found consumer segments regarding sustainable food consumption.

2.3.1. Socio-demographics

In nearly all the articles considered herein, socio-demographic variables are included as profiling variables. In only one of the 16 articles a socio-demographic variable, namely age, was used as a segmentation criterion (Kihlberg & Risvik, 2007). Two age segments are profiled according to their values, revealing a different value pattern between consumers under 30 years of age and consumers over 30 years of age. This study concludes that the younger group of organic consumers is characterized mainly by modern and materialistic values, whereas the older group appears to have more traditional values.

Gender, age and education were most frequently included as socio-demographic profiling variables. Gender was included in twelve articles. In six studies, significant differences across segments have been found (Gil et al., 2000; Honkanen & Olsen, 2009; Jain & Kaur, 2006; Kihlberg & Risvik, 2007; Tivadar & Luthar, 2005; Yue, Grebitus, Bruhn, & Jensen, 2010). Two of these studies that distinguished a green consumer segment found that there were more females than males in this segment (Gil et al., 2000; Jain & Kaur, 2006). Moreover, in two other studies, men seemed to be less concerned with the environment than women (Honkanen & Olsen, 2009; Yue et al., 2010). Age was included as a profiling variable in eleven articles. In five of these studies, age differed significantly across segments, but no clear picture was found (Bernabéu, Brugarolas, Martínez-Carrasco, & Díaz, 2008; Gil et al., 2000; Jain & Kaur, 2006; Saba & Messina, 2003; Yue et al., 2010). Education was included in ten articles. In six of these studies, education differed significantly between segments (Bernabéu et al., 2008; Gil et al., 2000; Honkanen & Olsen, 2009; Jain & Kaur, 2006; Tivadar & Luthar, 2005; Yue et al., 2010). For example, Gil et al. (2000) stated that organic consumers and likely organic food consumers had lower education levels compared to unlikely organic consumers, whereas Jain and Kaur (2006) showed that higher education had a positive effect

on environmental knowledge and behavior. An overview of the socio-demographic variables that have been included in the segmentation studies can be found in Table 2.2.

Table 2.2. Socio-demographic segmentation and profiling variables.

	Segmentation variables	Profiling variables*
<i>Socio-demographics</i>		
Age	11**	1, 2, 4, 6, 7, 8, 9, 10, 13, 14, 15, 16
Education		1, 2, 4, 6, 8, 10, 13, 14, 16 (education) 9 (type of School)
Gender		1, 2, 4, 6, 7, 8, 9, 10, 11, 13, 14, 16
Social class		8
Household/family size		2, 6, 8, 10, 16
Income		1, 2, 6, 9, 10, 14, 16
Parents' education		14
Employment		1 (work role), 4, 9 (occupation), 14 (employment status)
Residence/habitat		1, 13, 14
Marital status		2
Age of children		10
Number of children		10, 16

Note. *In brackets the variable used in that article is given.

Note. **Numbers refer to the studies listed in Table 2.1.

2.3.2. Personality characteristics

Three of the 16 articles based their segmentation on personality characteristics. In two of these studies, values were used as personality characteristics (Chrysohoidis & Krystallis, 2005; Fraj & Martinez, 2006). Chrysohoidis and Krystallis (2005) concluded that the most prevalent organic purchasing motives for Greek consumers in decreasing importance were health-consciousness (connected to self-respect), pursuit of hedonism (connected to fun) and environmental consciousness (connected to belonging). Fraj and Martinez (2006) investigated which values and lifestyles best predicted ecological behavior. They found a significant positive effect of the construct “adventurous spirit” on ecological behavior. In the third article, need for cognition and a behavioral variable, namely purchase likelihood, were used (Deliza, Rosenthal, Hedderley, MacFie, & Frewer, 1999). The two segments found were (1) a price-oriented segment and

(2) a production-method oriented segment. However, these segments did not differ significantly regarding their need for cognition.

Two articles included personality characteristics as profiling variables. In one study, segments were identified based on age and profiled by values (Kihlberg & Risvik, 2007). This study showed that the lowest frequencies of organic product consumption were significantly related to the values of honoring parents and elders, authority, wealth, cleanliness, ambition and respect for traditions. The highest organic consumption frequencies were significantly related to spirituality, curiosity, world of beauty and unity with nature. In the other study, segments were based on environmental attitudes and were also profiled by values (Grunert & Juhl, 1995). This study revealed two clusters based on environmental attitudes: a green cluster with positive environmental attitudes, characterized by values of universalism, benevolence and self-direction, and a white cluster with less positive environmental attitudes, characterized by values of security, conformity, tradition and power.

2.3.3. Food-related lifestyle

Ten of the 16 articles used food-related lifestyle variables as their basis of segmentation. In one of these articles the Values and Lifestyles Scale was used as a segmentation criterion, combining lifestyle variables with personality characteristics (Fraj & Martinez, 2006). In three studies, the level of lifestyle was combined with the level of behavior. In these studies, both organic attitudes and organic buying (intention) were used as segmentation criterion (D'Souza, Taghian, & Lamb, 2006; Grunert & Juhl, 1995; Mostafa, 2009; Saba & Messina, 2003). In the remaining six studies, segmentation was based solely on lifestyle variables (Bernabéu et al., 2008; Gil et al., 2000; Honkanen & Olsen, 2009; Tivadar & Luthar, 2005; Walley, Custance, & Parsons, 2000; Yue et al., 2010). Many different lifestyle variables have been used, such as life equilibrium, environmental concern, environmental attitudes and the perceived importance of health care, resulting in many different segments.

In eleven articles, food-related lifestyle variables were included to profile consumer segments. These articles included a broad variety of variables. Variables that were often included and that seemed to be useful given their significant differences among segments, were attitudes and concerns towards the environment and attitudes towards (organic) food (Bernabéu et al., 2008; Chryssohoidis & Krystallis, 2005; Gil et al., 2000; Kihlberg & Risvik, 2007).

2.3.4. Behavior

Six studies used behavioral variables as their basis of segmentation. In one study, purchase likelihood (behavior) and need for cognition (personality characteristic) were both included as segmentation variables (Deliza et al., 1999). Clusters were formed based on a conjoint analysis of the features impacting purchase likelihood. These differences in purchase likelihood resulted in two clusters, but these clusters did not differ in their need for cognition. In four studies, behavioral variables were combined with food-related lifestyle variables to segment the respondents (D'Souza et al., 2006; Grunert & Juhl, 1995; Mostafa, 2009; Saba & Messina, 2003). The variables used in these four studies mainly combined green behavior and environmental attitudes. In the remaining study, only a behavioral variable, namely purchase decision, was used (Janssen et al., 2009).

In twelve studies, behavioral variables were included as profiling variables. These behavioral variables consisted mostly of organic buying behaviors (Chrysohoidis & Krystallis, 2005; Janssen et al., 2009; Grunert & Juhl, 1995), consumption frequencies (Saba & Messina, 2003; Gil et al., 2000) or green purchase intentions (D'Souza et al., 2006; Saba & Messina, 2003). Three articles reported significant behavioral differences across the segments (Chrysohoidis & Krystallis, 2005; Gil et al., 2000; Yue et al., 2010). Chrysohoidis and Krystallis (2005) found that their "loyal" cluster had purchased the most organic products, followed by the "explorers" and the "health conscious" cluster. The "independents" had the lowest organic purchase frequency. Gil et al. (2000), who segmented based on lifestyle variables, found that organic food consumers had the highest organic consumption, followed by the likely consumers, and that the unlikely consumers had the lowest organic consumption. Yue et al. (2010) found that their healthy diet-oriented segment demonstrated a higher consumption level of organic potatoes, compared to the industry-trusting and the price-oriented segments.

The behavioral variables used either as segmentation basis or as profiling variables were mostly related to (organic) product choices. One study also included non-product related behavioral items, such as joining clean-up drives, contacting a community agency to find out what can be done about pollution, subscribing to ecological publications and attending a meeting on a better environment (Fraj & Martinez, 2006). An overview of the variables that have been included in the segmentation studies can be found in Table 2.3.

Table 2.3. Segmentation and profiling variables classified by level.

	Segmentation variables*	Profiling variables*
<i>Personal</i>		
Need for cognition	4**	
Values*	2, 5	7, 11
<i>Lifestyle</i>		
Balanced life	5 (stress free lifestyle) 6 (life equilibrium)	
Mediterranean diet	6	
Food orientation	14 (necessity vs. luxury/freedom) 14 (orientation to ethics of sobriety and restraint in food)	
Product-specific preferences	1 (wine preferences) 16 (attitude toward potato attributes)	1 (attitudes on wine purchasing) 11 (liking of bread types)
Organic beliefs	12 (environmental altruism scale) 13 (organic beliefs)	2 (organic beliefs) 13 (risks and benefits with regard to pesticides)
Environmental concern	5 (involvement in environmental issues) 8 (concern for fish welfare) 12 (ethical concern)	1 (concern about nature) 2 (attitudes and involvement towards organic) 4, 6 (environmental concern) 13 (trust in organic fruits and vegetable consumption)
Health concern		1 (concern about food/health)
Healthy lifestyle	5 (healthy consumption habits)	8 (health involvement)

WTP organic		6
<i>Behavior</i>		
Ecological behavior	12 (green behavior)	5 (ecological behavior)
Purchase intention	4 (purchase likelihood of oils) 12 (green purchase intention)	1 (wine purchase intention) 2 (exploratory buying behavior tendency) 3 (purchase intention) 13 (buying intention)
Fish consumption		8
Dieting behavior		2
Organic consumption	7 (organic buying frequency) 10 (organic product choices)	1 (organic wine consumption) 2 (frequency of organic purchase) 6 (organic food consumption) 10 (usual organic buying behavior) 13 (consumption frequency of organic fruit and vegetables)
Cooking frequency		16 (organic potatoes consumption)
Frequency of eating out		14
Use of home meal replacements		14 14

Note. *In brackets the variable used in that article is given.

Note. **Numbers refer to the studies listed in Table 2.1.



2.3.5. Consumer segments

The literature distinguishes different sustainable consumer types based on a number of variables. Gender, age and education were the most frequently used socio-demographic variables, but their capacities for profiling sustainability segments remain ambiguous. Values were the most frequently used personality characteristics. Openness to change, self-transcendence, conservation, and self-enhancement were the most discriminating values. On the domain-specific level, concern and attitudes regarding the environment and attitudes towards organic food further distinguished consumer segments. With regard to behavior, mainly green buying or green consumption frequency was included. These variables have been used to distinguish several consumer segments within multiple studies. After comparing these consumer segments across studies, three overall consumer segments were differentiated. In the majority of the studies (nine articles), some kind of green consumer segment was found. Most of the time, a non-green segment was identified next to a green segment, and sometimes one or two segments in between green and non-green were determined (for example, potential greens). An overview of the most frequently found segments and their characteristics is given below.

Green segment

Studies that identified a green consumer segment and included personal values for segmentation or profiling showed a strong overlap in the personal values of these green consumers (Grunert & Juhl, 1995; Kihlberg & Risvik, 2007; Chryssohoidis & Krystallis, 2005; Fraj & Martinez, 2006). Green consumers were mainly characterized by values belonging to the domains of self-transcendence and openness to change. Self-transcendence refers to collective values that motivate people to transcend selfish concerns and promote the welfare of others (Schwartz, 1992). More specifically, the individual value of self-direction, focusing on independent thought and action, was the most prominent for these consumers. In summary, these results indicate that both individual and collective values are important for characterizing the green consumer.

Concerning food-related lifestyles and behaviors, several studies indicate that green consumers have more favorable attitudes and are more concerned about the environment. Grunert and Juhl (1995) found relatively favorable environmental attitudes among regular organic buyers. This finding is in accordance with Saba and Messina (2003), who showed relatively favorable beliefs and attitudes towards organic fruits and vegetables among consumers with high organic buying frequencies.

Furthermore, Chryssohoidis and Krystallis (2005) found that attitudes toward and involvement with organic food were most favorable among loyal organic consumers. Mostafa's (2009) segment of "True Greens" scored high on a range of characteristics including environmental knowledge, environmental attitudes, environmental concern and intention to buy green products. Gil et al. (2000) concluded that the most likely buyers of organic food were more concerned about environmental degradation than buyers who were less likely to purchase organic food. Moreover, the former were also more concerned with health than the latter. Honkanen and Olson (2009) and Janssen et al. (2009) found similar results.

Potential green segment

Half of the studies reviewed herein identified one or more consumer segments between green consumers and non-green consumers. Different names have been used for these "potential greens", including "explorers," "likely consumers" and "occasional buyers".

The explorers identified by Chryssohoidis and Krystallis (2005) are relatively frequent organic buyers who attach importance to self-respect and fun but who especially value belonging and claim to follow a balanced and healthy diet. Although these consumers worry about chemicals, they are the least aware of environmental problems. Furthermore, these consumers believe that organic food is better than conventional food (Chryssohoidis & Krystallis, 2005). The "likely consumers" distinguished by Gil et al. (2000) attach importance to natural food and a balanced life and hold the most positive attitudes toward organic food products compared to the other segments (Gil et al., 2000). Mostafa's potential green segment scored highest with regard to attitudes towards and intention to buy green products, but this segment is also skeptical towards environmental claims (Mostafa, 2009). Based on organic buying behavior, Grunert and Juhl (1995) identified a group that scored between high and low buyers of organic products with regard to their environmental attitudes (Grunert & Juhl, 1995). D'Souza et al. (2006) distinguished a price-oriented green consumer segment that is aware of environmental risks and reads labels but is very price sensitive. Overall, the potential green consumer segments described in the studies reviewed herein seem to be very heterogeneous across the different studies, but it seems that next to environmental factors, importance is attached to other factors such as price, health and naturalness as well.

Non-green segment

The non-green consumer segments found in the studies reviewed herein, including personal values for segmentation or profiling, are characterized by collective values of conservation (e.g. security, conformity and tradition) and individual values of self-enhancement (e.g. power and achievement) (Grunert & Juhl, 1995; Kihlberg & Risvik, 2007).

At the level of food-related lifestyles, Gil et al. (2000) found that unlikely green consumers showed negative attitudes towards the environment. This is in accordance with Grunert and Juhl (1995), who found that the so-called “whites” scored low on environmental attitudes. Mostafa (2009) found a segment that he named “the basic browns,” characterized by the lowest concerns and knowledge among all segments and the lowest attitudes towards green purchases. Finally, Janssen et al. (2009) found that “conventional buyers” were carefree. These consumers found organic products too expensive; expressed lower concern for genetic modification, artificial flavors and additives; and they trusted the industry.

2.4. Conclusions

Based on the results of the current study, we can formulate several conclusions. With regard to the different types of variables, it can be concluded that socio-demographic characteristics have mainly been used as profiling variables. Gender, age and education were the most frequently included socio-demographic variables but the results were somewhat ambiguous. This finding is in line with Dagevos (2005), who argues that socio-demographic characteristics have lost much of their power in explaining contemporary consumer groups. Diamantopoulos et al. (2003) also pointed to the limited utility of using socio-demographic characteristics for profiling environmentally conscious consumers. Personality characteristics were not often included in the consumer segmentation studies reviewed herein. The studies that included personality characteristics for segmentation or profiling mainly used personal values. Values have been found to differ between the identified sustainable food segments, indicating that values, belonging to the level of personality characteristics, are suitable for sustainable food consumer segmentation. Food-related lifestyle variables were often included in the studies reviewed, both for segmentation and for profiling purposes. Lifestyle variables, mainly attitudes and concerns toward nature and attitudes towards (organic) food, seemed to be useful in segmenting consumers and in profiling segments.

Behavioral variables were included in most of the studies, either for segmentation or profiling purposes. As expected, different consumer groups showed different behaviors regarding sustainable consumption. Thus, it is important to include values, food-related lifestyle variables and behavioral variables in sustainable food segmentation studies.

Furthermore, conclusions can be drawn from this review with respect to sustainable food consumer segments. We have attempted to identify the most important consumer groups, resulting in the following three segments: “greens”, “potential greens” and “non-greens”. Based on the 16 studies considered here, these are the most frequently identified consumer segments. They differed from one another on all three levels of abstraction. Thus, overall it can be concluded that the three levels of abstraction proved to be helpful in categorizing the segmentation studies because the variables used in segmentation studies fit all three levels of abstraction (personality characteristics, food-related lifestyle variables and behavioral variables).

2.5. Discussion

The current study aims to provide an overview of published studies until November 2010 that have segmented consumers based on their personality characteristics, their food-related lifestyles and their behavior with regard to sustainable food consumption. First of all, it is remarkable that all but one study (Tivadar & Luthar, 2005) focused on the environmental aspects of sustainable food consumption, particularly because sustainable food consumption focuses on a wide variety of topics in addition to the environment, such as animal welfare and Fair Trade (e.g. Barr & Gilg, 2006; Grunert & Juhl, 1995; Lockie et al., 2002; Raynolds, 2002). Research on these topics is needed to obtain a more complete picture of existing sustainable food consumer segments. Some recent articles have been published on animal welfare segmentation, showing a similar picture as has been found in this study (Cerjak, Karolyi, & Mesic, 2011; De Barcellos, Krystallis, de Melo Saab, Kügler, & Grunert, 2011; Krystallis, de Barcellos, Kügler, Verbeke, & Grunert, 2009). All three studies found an indifferent segment, comparable to the non-green segment. Comparable to the “green” segment, all three studies distinguished an involved segment. For Krystallis et al. (2009) this segment consists of respondents involved with small farms, De Barcellos et al. (2011) found a sustainability-oriented segment that attaches great importance to housing and floor type of the stocks and Cerjak et al. (2011) found a segment that is concerned about animal welfare. In line with our “potential-green” segment, all three studies found one or two segments in between the indifferent and the involved segment. De Barcellos et

al. (2011) distinguished an environmental conscious segment and Krystallis et al. (2009) distinguished an environmental conscious and an animal welfare conscious segment. Cerjak et al. (2011) found a segment that attaches importance to animal welfare, but believe that modern food production without high animal welfare standards is inevitable. Research on Fair Trade segmentation is scarce. Bezençon and Bili (2011) showed that consumers' age and the distribution channels where consumers buy their food are important in segmenting the Fair Trade market, but future research is needed to get a more complete picture of Fair Trade consumer segments.

With respect to the included segmentation and profiling variables, research on the level of personality characteristics is lacking (Nie & Zepeda, 2011). Mainly values have been used and one study included need for cognition, but future research is needed to investigate whether other personality characteristics could be useful to include in segmentations. At the behavioral level, it is remarkable that mainly (green) product purchases or consumption were used. Only one study included behavioral items that were act-related (as opposed to product-related), for example, joining clean-up drives or contacting a community agency to find out what can be done about pollution. It would be worth investigating the possibilities of act-related behavioral variables for segmentation purposes, as it is expected that different sustainable food consumer segments will be characterized by different types of behavior. Product-related behavior implies mainly price-related investments, whereas act-related behavior mainly requires time and effort in everyday behavioral patterns. Price may be an important factor in this distinction, as indicated by the work of Abeliotis, Koniari and Sardianou (2010), who found that higher income groups are less likely to act "green" (operationalized by the 3R concept: reducing consumption and thereby waste, reusing products and recycling), whereas they are more habitual purchasers of organic food compared to other consumers. Future research is necessary to investigate the distinction between product-related and act-related behaviors and their respective associations with sustainable food consumer segments.

It appears difficult to draw clear conclusions regarding the number of consumer segments that can be distinguished and their respective characteristics. The investigated studies show different results with respect to the identified numbers and types of segments. This may be because the investigated studies include different variables for segmentation and for profiling, different levels of variables, different target groups in different countries and/or different analytical methods. We identified a "green", "potential green" and "non-green" segment, based on the most frequently identified consumer segments, but other possible segments should be researched. Some recent studies have

formulated segments based on food-related lifestyles (Jang, Kim, & Bonn, 2011; Nie & Zepeda, 2011; Zakowska-Biemans, 2011). All studies found four or five segments. For example Zakowska-Biemans (2011) found traditionalist, pragmatist, conscious, careless and uncommitted consumer segments and Nie and Zepeda (2011) found adventurous, rational, careless and conservative/uninvolved segments. Comparable to our non-green segment, all studies found one or two careless or uninvolved segments. Our green consumer segment is partly comparable to the adventurous segment (which scores highest on organic purchases and environmental concern), distinguished by Nie and Zepeda (2011) and the post-materialists (who attach high importance to the environment and health) distinguished by Schäfer, Jaeger-Erben and dos Santos (2011). Future research is needed to see whether other consumer segments should be added.

This literature review underscores the importance of price in segmenting sustainable food consumers. Price-oriented segments have been found in various studies (Bernabéu et al., 2008; Deliza et al., 1999; D'Souza et al., 2006; Yue et al., 2010); however, this review does not clarify whether these price-oriented consumers can be categorized as non-greens or as potential greens. Price might be a barrier for green purchases, but it is also possible that price-oriented consumers are careless about the environment. Recent literature shows results in both directions. The study of Nie and Zepeda (2011) shows that the rational segment, which scores average on organic consumption, is the most price-conscious segment, followed by the conservative/uninvolved segment. Jang et al. (2011) show that the health-conscious segment attaches the highest importance to value for money, followed by the uninvolved. Zakowska-Biemans (2011) shows that both the traditionalists (who score high on organic consumption) and the careless (who score low on organic consumption) are price-sensitive. These results suggest that two types of price-sensitive consumers exist: one segment that values green behavior but price might be a barrier, and one careless price-sensitive segment. Although it can be concluded from this review that price is an important factor to consider when performing sustainable food segmentation, further investigation is necessary to assess the relationship between price and sustainable food segments.

In addition to price, another important factor in sustainability segmentation appears to be health. In segmenting consumers with respect to sustainable food consumption, health has been found to play an important role (Chrysohoidis & Krystallis, 2005; Gil et al., 2000; Janssen et al., 2009; Honkanen & Olsen, 2009; Yue et al., 2010). Interestingly, the importance of health is much less salient in the potential green segment. Gil et al. (2000) found that, compared to likely organic consumers, organic food consumers had a much higher score regarding the importance of health care. This raises the question of whether the importance attached to health is a good

predictor of sustainable consumption, at least for a particular consumer segment.

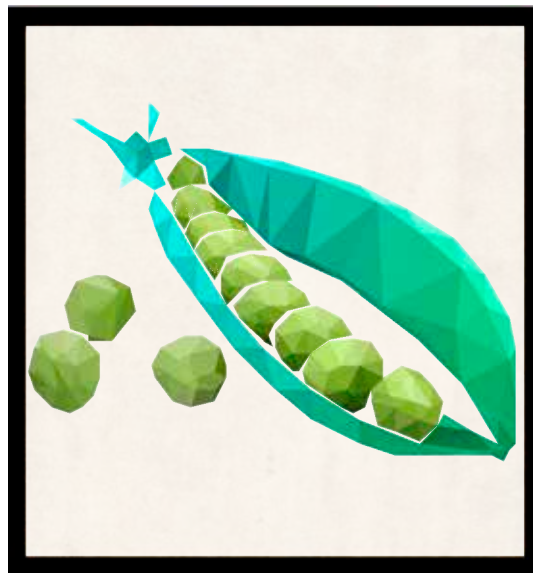
Recent literature shows some indications that for certain consumer segments, green attitudes or behavior go hand in hand with importance attached to health (Schäfer et al., 2011; Nie and Zepeda, 2011; Jang et al., 2011; Zakowska-Biemans, 2011). For example, Schäfer et al. (2011) distinguish a small segment labelled “Quality of Life-Oriented Post-Materialists” who consider health and the environment in nutritional decisions and are also interested in energy saving. We suggest future studies to compare the domains of health and sustainability. Such a comparison could have high theoretical as well as practical relevance. First of all, identifying the levels and types of variables that are most important in segmenting healthy and sustainable consumers could obviously be useful in future segmentation studies. Next, gaining insight into the overlapping characteristics of healthy and sustainable consumer segments could be useful in developing more efficient promotional campaigns to stimulate healthy and sustainable lifestyles.

Our findings have important implications for future research, as they indicate that socio-demographic variables alone are not sufficient for segmenting sustainable food consumers. Personality characteristics, food-related lifestyle variables and behavioral variables should all be considered in future segmentation studies on sustainability. Although it is impossible to identify the exact number of sustainable food consumer segments, the present overview indicates that consumers can be divided into several sustainability groups that differ on all three levels of abstraction. Attempts at stimulating sustainable consumption might be most effective when these differences across consumer segments are taken into account. Future research is needed to explore the characteristics of different sustainable food consumer segments with respect to their potential use in promoting sustainable development.



Chapter 3

Sustainable food consumption:
Product choice or curtailment?



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Abstract

Food consumption is an important factor in shaping the sustainability of our food supply. The present paper empirically explores different types of sustainable food behaviors. A distinction between sustainable product choices and curtailment behavior has been investigated empirically and predictors of the two types of behavior have been identified. Respondents were classified into four segments based on their sustainable food behaviors: unsustainers, curtailers, product-oriented consumers, and sustainers. Significant differences between the segments were found with regard to food choice motives, personal and social norms, food involvement, subjective knowledge on sustainable food, ability to judge how sustainably a product has been produced and socio-demographics. It is concluded that distinguishing between behavioral strategies toward sustainable food consumption is important as consumer segments can be identified that differ both in their *level* of sustainable food consumption and in the *type* of behavior they employ.

3.1. Introduction

The modern food system faces many sustainability challenges. The environmental, social and economic consequences of food production and consumption are important issues in developed countries (Reisch, Eberle, & Lorek, 2013; Vinnari & Tapio, 2012). Consumers can significantly improve the sustainability of their food consumption, for example by consuming organic products and reducing meat consumption (Jungbluth, Tietje, & Scholz, 2000). Improvements can be achieved in several ways and should consider both sustainability of production and the quantity consumed (Hoogland, de Boer, & Boersema, 2005). This paper's focus is on the demand side of the food market. From this consumer perspective, two broad behavior strategies toward sustainable food consumption can be distinguished: sustainable product choices concerning the way the product is produced (e.g. organic, free range or Fair Trade products), and sustainable dietary patterns concerning dietary composition and consumption curtailment (reduced quantity) within product categories (e.g. little meat consumption). The issue of how these behavioral strategies could be understood and should be promoted and applied is an important though mainly unexplored research topic in the field of sustainable food consumption. This study explicitly includes both strategies and explores differences in their determinants. In general, consumers are more reluctant to (partly) eliminate meat from their meals as compared with consuming other (more sustainable) types of meat (Vanhonacker, van Loo, Gellynck, & Verbeke, 2013). However, consumers may differ in the strategies that appeal to them most and fit them best. Therefore, the present study not only aims to empirically distinguish between behavioral strategies but also to explore which consumer segments can be identified based on the performance of these behavioral strategies.

3.1.1. Sustainable product choices

Since the beginning of this century, a stream of (marketing) research has originated in which attitudes towards and consumption of sustainably produced food products are studied (e.g. Annunziata, Ianuario, & Pascale, 2011; Bezençon & Bili, 2011; Kareklas, Carlson, & Muehling, 2014). Specifically, consumer choice of organic products has been widely investigated (e.g. Lockie, Lyons, Lawrence, & Grice, 2004). Many determinants of sustainable product choices can be found in the food literature, including positive attitudes toward sustainable food, social and personal norms, knowledge on sustainability and food, and involvement with (sustainable) food (Aertsen, Verbeke, Mondelaers, & van Huylenbroeck, 2009; Arvola et al., 2008; Bezençon & Bili,

2011; De Boer, Hoogland, & Boersema, 2007; Dowd & Burke, 2013; Nurse Rainbolt, Onozaka, & McFadden, 2012; Tanner & Kast, 2003; Toma, McVittie, Hubbard, & Stotta, 2011; Vermeir & Verbeke, 2006). A well-established behavioral theory that has often been applied in food studies is the Theory of Planned Behavior (TPB), including the concepts of attitude, social norms and perceived behavioral control (Ajzen, 1991). Several studies show the predictive validity of the TPB for sustainable food choices (e.g. Dowd & Burke, 2013; Robinson & Smith, 2002). In addition, the Norm Activation model (Schwartz, 1977), including the concept of personal norms, has been related to sustainable consumer behavior (De Groot & Steg, 2009; Onwezen, Antonides, & Bartels, 2013).

The inclusion of food choice motives is of added value in explaining sustainable food choices beyond the theories mentioned above (Dowd & Burke, 2013; Toma et al., 2011). Health motives, environmental motives, naturalness and taste all contribute to the purchase of sustainable products, whereas prices, perceived time barriers, unawareness of the environmental impact of food and unavailability might be barriers to purchasing sustainable foods (Lea & Worsley, 2005; Mäkinieimi & Vainio, 2014; Tanner & Kast, 2003; Tobler, Visschers, & Siegrist, 2011; Vanhonacker & Verbeke, 2009).

Finally, research on the relation between socio-demographic factors and organic food purchases shows that women seem more likely to purchase organic food compared to men (Aertsens et al., 2009; Hughner, McDonagh, Prothero, Shultz, & Stanton, 2007). Research on other socio-demographic characteristics shows mixed results (Aertsens et al., 2009; Tanner & Kast, 2003; Toma et al., 2011).

3.1.2. Sustainable dietary patterns

The purchase of sustainably produced products is important but insufficient and should not be the only way toward more sustainable food consumption (Baroni, Cenci, Tettamanti, & Berati, 2007; Garnett, 2011). Therefore, we discuss a second relevant stream of literature, concerning the sustainability impact of dietary composition. Curtailment of consumption within food categories that cause a high environmental burden is an important pathway to reduce the environmental impact of one's diet (Foresight, 2011; Garnett, 2011; Jungbluth et al., 2000). Key in this strategy is that products in unsustainable product categories are substituted by products in *other* product categories that have a lower sustainability impact (or not substituted at all, leading to a reduction in total food intake). Especially animal-based products (meat and dairy) are resource-intensive and therefore from a sustainability perspective a broad consensus exists about the benefits of less animal-based and more plant-based diets (Baroni et al.,

2007; Garnett, 2011; Health Council of the Netherlands, 2011; Pimentel & Pimentel, 2003; Tilman & Clark, 2014; Tukker & Jansen, 2006; Tukker et al., 2011; Westhoek et al., 2011).

The (non)consumption of meat takes a special position in food debates and receives growing attention in contemporary literature (e.g. Dagevos & Voordouw, 2013; De Boer, Schösler, & Aiking, 2014; Hoek et al., 2011; Rothgerber, 2014; Ruby, 2012, Verain, Dagevos, & Antonides, 2015). Meat holds a central position in western diets, is associated with status and masculinity, and stands on top of the food hierarchy (Ruby & Heine, 2011; Twigg, 1983), but is also related to restrictions imposed by religion, health issues, environmental burden and animal welfare issues (Fox & Ward, 2008). The stream of literature on meat curtailment started from a health perspective (e.g. Allen & Baines, 2002), but the focus has more and more shifted toward sustainability gains. Reduction of meat consumption is one of the most important recommendations toward more sustainable food consumption (Health Council of the Netherlands, 2011; Jungbluth et al., 2000).

Meat curtailment can take several forms. One way to curtail meat consumption is by decreasing meat portion size, another option is to reduce the frequency of meat eating, by consuming meatless meals several times a week (see also De Boer et al., 2014; Verain et al., 2015). An extreme form of meat curtailment is vegetarianism. When meat consumption is curtailed, meat can be substituted by other products that can be either animal based (e.g. fish, cheese) or plant based (e.g. lentils, “veggie” burger).

Determinants of meat avoidance include attitudes, norms, perceived behavioral control and habits (Povey, Wellens, & Conner, 2001; Zur & Klöckner, 2014). Moreover, food involvement is important in meat curtailment (De Boer et al., 2007).

Motives that play a role in meat avoidance are related to health, moral and ethical beliefs, concerns about animal welfare, environmental impact, sensory aspects, religion, and aspirations to belong to a reference group (De Backer & Hudders, 2015; Fox & Ward, 2008; Janda & Trocchia, 2001; Lea & Worsley, 2001; Hoffman, Stallings, Bessinger, & Brooks, 2013; Ruby, 2012; Zur & Klöckner, 2014). Whereas ethical motives are the main reason for complete meat avoidance, meat curtailment is mainly motivated by health concerns (Tobler et al., 2011). Appreciation of meat, lack of knowledge and familiarity with meat substitutes, lack of cooking skills, habits, and low awareness or disbelief of the environmental impact of meat consumption are barriers for meat curtailment (Lea & Worsley, 2001, 2008; Mäkinemi & Vainio, 2014; Schösler, de Boer, & Boersema, 2012; Vanhonacker et al., 2013).

Regarding socio-demographic characteristics, gender is found to be a significant predictor of meat curtailment (De Boer et al., 2014; Hayley, Zinkiewicz & Hardiman, 2015; Schösler et al., 2012; Tobler et al., 2011). In addition, higher education, higher socio-economic status, smaller household sizes and higher age levels appear related to a higher level of meat curtailment (De Boer et al., 2014; Hoek, Luning, Stafleu, & de Graaf, 2004; Schösler et al., 2012).

3.1.3. Consumer segmentation

In studying sustainable behaviors, it is important to take the heterogeneity of consumers into consideration (e.g. Dolnicar & Grün, 2009). Consumers may differ in the importance they attach to sustainability, in the frequency with which they perform sustainable behaviors and in the type of sustainable behaviors they perform. Existing consumer segmentations are generally focused on one type of sustainable behavior, such as the purchase of organic foods, resulting in consumer segments that differ in the level of performance of that behavior (Verain et al., 2012). However, “green” consumers, who attach importance to sustainability and who behave sustainably are still not homogeneous as they may differ in the type of sustainable behavior they prefer (Hughner et al., 2007; Jansson, Marell, & Nordlund 2009, 2010; Ozcaglar-Toulouse, Shiu, & Shaw, 2006; Verain et al., 2012). Hence, we expect that for some consumers it might be most appealing to purchase sustainable products, whereas other consumers may prefer curtailment (Abeliotis, Koniari & Sardanou, 2010; Jansson et al., 2009). Identifying consumer segments with common needs and characteristics is essential for the positioning of sustainable products and for developing effective communication strategies around sustainable food consumption (e.g. De Jonge & van Trijp, 2013; Vanhonacker & Verbeke, 2009).

3.1.4. Present study

Although sustainable product choices and curtailment behavior are two topical strategies toward sustainable food consumption that figure implicitly or explicitly in the literature (e.g. De Bakker & Dagevos, 2012; De Boer et al., 2007; De Boer et al., 2014; Schösler et al., 2012; Vanhonacker et al., 2013; Vinnari & Tapio, 2012), empirical research on the distinction between these strategies is still lacking. Therefore, this research adds to the existing literature by empirically exploring the distinction between the two types of sustainable food behavior. Determinants of both types of behavior will be investigated to provide insights into consumer decision processes concerning sustainable food behavior. Three categories of determinants will be included in the

analysis: socio-demographic variables (gender, age, education and income), domain-specific psychosocial variables (social and personal norms, ability, subjective knowledge and food involvement), and a range of food choice motives. These determinants have been identified in the literature as important in sustainable product choices and/or curtailment behavior and have been discussed above. The included domain-specific psychosocial determinants are part of well-established behavioral theories, such as the Theory of Planned Behavior (TPB) (Ajzen, 1991), the Value-Belief-Norm model (VBN) (Stern, 2000), the Norm Activation model (Schwartz, 1977), and the model used by Vermeir and Verbeke (2006) based on the consumer behavior model by Jager (2000). Food choice motives have been included as they are more concrete than the psychosocial determinants and appear to be important additional predictors (Dowd & Burke, 2013). Since our research is exploratory, we refrain from stating hypotheses concerning the specific effects of the determinants of sustainable product choices and curtailment behaviors.

In addition, this paper adds to the literature by empirically identifying consumer segments that differ in the strategy applied toward sustainable food consumption. The resulting segments will be profiled on relevant variables such as norms, motives and involvement in order to gain insights into their characteristics. Segmentation studies including different types of sustainable food behaviors are limited (for exceptions, see De Boer et al., 2014 and Vanhonacker et al., 2013). By including two types of behaviors (sustainable product choices and curtailment), the current research will provide insight into differences among consumers, not only quantitatively in terms of the amount of sustainable food behaviors, but also qualitatively regarding the types of sustainable food behavior.

3.2. Method

3.2.1. Data collection

Cross-sectional data were collected in autumn 2011 through an online consumer survey. A research agency collected the data and selected a sample of Dutch adult consumers who were representative for gender and age from their online panel. The initial sample consisted of 1012 respondents. As the complete questionnaire was considered lengthy (281 items), a deletion procedure was applied to remove respondents that showed fatigue. This was done by removing respondents that had no dispersion in their answers on entire questions (around 50 items per question) in the second part of the questionnaire. The remaining sample consisted of 942 respondents of which

50.4% were male and 49.6% were female. The respondents' age ranged from 18 to 65 years with a mean of 42.3 years; 20.1% had a low education level; 41.4% had a medium education level and 38.5% had a high education level; 28,3% lived in single households¹.

3.2.2. Segmentation variables

To our knowledge, no validated scales exist to measure sustainable product choices and food curtailment behavior. Therefore, we developed new scales by combining information from several sources. For the operationalization of the two types of sustainable food behaviors we based our items on the descriptions of behavioral strategies with regard to sustainable food consumption discussed in the literature (Barr, Gilg, & Ford, 2005; De Bakker & Dagevos, 2012; Schösler et al., 2012). From this literature we deduced the following aspects: organic, free-range and products with a sustainability label to operationalize sustainable food choices and reducing portion size and reducing consumption frequency of unsustainable products to operationalize curtailment. The selection of product groups (meat, dairy and fruits and vegetables) has been based on dietary guidelines for sustainable diets, in which it is argued that we should eat less animal-based products (meat and dairy) and more plant-based products (e.g. Health Council of the Netherlands, 2011).

Sustainable food behavior was measured with nine items (see Table 3.1.). The respondents were asked to indicate for each of nine sustainable food behaviors whether they performed the behavior, or had performed this behavior at least once a month in the previous year. All items were measured on a dichotomous scale with answer categories “yes” and “no” in order to put as little stress as possible on the memory capacities of the respondents.

3.2.3. Segment profiling variables

Profiling variables were included to gain more insight into similarities and differences across the segments. Food choice motives, personal norms, social norms, food involvement, subjective knowledge with regard to sustainable food, ability to judge how sustainable a product is produced, and socio-demographic characteristics were used as profiling variables.

¹ Distribution of the total Dutch population in 2011 was 49.5% males, with a mean age of 40.3 years; 31.7% had a low education level, 40.4% a medium education level and 27.8% had a high education level; 36.4% lived in single households.

Food choice motives. Fifteen food choice motives have been included in the questionnaire. The respondents were asked to indicate on a scale from 1 (“Totally no reason”) to 10 (“An important reason”) to what extent these motives were decisive in buying a food product. The motives were measured as single items and included: organic, labelled, animal friendly, environmentally friendly, home brand, origin, local, well-known (“I buy regularly/often”), A-brand, ready to eat, portion size, price, taste, healthiness, and sustainability. These motives were partly based on the Food Choice Questionnaire (Steptoe, Pollard & Wardle, 1995) and the ethical food choice motives added by Lindeman and Väänänen (2000). The 15 items were included in a principal components analysis to search for underlying factors. Four factors were identified but the Cronbach’s Alpha of three of these factors was low (α of .62, .51 and .45). Only the sustainability items (organic, labelled, animal friendly, environmentally friendly, origin, local, and sustainability) formed a reliable scale ($\alpha=.90$). Therefore, in subsequent analysis the sustainability items were combined into one sustainability construct. In order to keep the reported values comparable to the other food choice motives, we computed the sustainability construct by averaging the seven items, instead of using the factor score.

Personal norms with regard to sustainable behavior. Four items on personal norms with regard to sustainable behavior were included in the questionnaire (e.g. “I feel morally obliged to behave sustainably”). The items were measured on a 7-point scale from “Totally not” to “Totally.” The items were partly based on Gärling, Fujii, Gärling & Jakobsson (2003) and Bamberg, Hunecke & Blöbaum (2007) and were adapted for sustainability. The four items were captured by one factor explaining 84.9% of the item variance. Cronbach’s Alpha was very high ($\alpha=.94$).

Personal norms with regard to healthy and sustainable eating behavior. Three items on personal norms with regard to healthy and sustainable food consumption were included in the questionnaire (e.g. “I feel morally obliged to eat healthy and sustainable food”). The items were answered on a 7-point scale from “Totally not” to “Totally.” The items were partly based on Gärling et al. (2003) and Bamberg et al. (2007) and were adapted for healthy and sustainable eating behavior. The three items were captured by one factor explaining 86.6% of the item variance. Cronbach’s Alpha was very high ($\alpha=.92$).

Social norms with regard to healthy and sustainable eating behavior. Two items on social norms with regard to healthy and sustainable food consumption were included in the questionnaire (e.g. “People who are important to me think I should eat healthily and sustainably”). The items were answered on a 7-point scale from “Totally

not” to “Totally.” The items were based on Bamberg et al. (2007) and were adapted for healthy and sustainable eating behavior. The two items were captured by one factor explaining 85.0% of the item variance. Cronbach’s Alpha was quite high ($\alpha=.82$).

Food involvement. Four items were included in the questionnaire to measure food involvement (e.g. “Talking about what I ate or am going to eat is something I like to do”). The items were answered on a 7-point scale from “Totally not” to “Totally” and were derived from Bell and Marshall (2003). An exploratory factor analysis showed that the items were explained by two factors with a Pearson correlation of $-.134$ significant at $p<.01$. The first factor was related to the items: “I like to cook for others and myself” and “I like to talk about the food I ate.” This factor was labelled social food involvement. The second factor was related to the items “Compared to other daily decisions, my food choices are unimportant” and “I do not think much about food.” Therefore, this factor was labelled personal food involvement. The two factors explained 71.9% of the item variance. The two items measuring social food involvement had a reliability of $\alpha=.63$. The two items measuring personal food involvement had a reliability of $\alpha=.57$.

Subjective knowledge on sustainable food. One item was included to measure subjective knowledge on sustainable food: “How much do you know in comparison to the average Dutch citizen with regard to food and sustainability?” The item was answered on a 7-point scale from “Very little” to “Very much.” This item was adapted from the measure for subjective knowledge with regard to environmental friendliness in Bartels et al. (2009).

Ability. One item was included to measure the perceived ability to judge food on the sustainability of production: “How easy or difficult do you think it is to judge how sustainably it (the product) has been produced?” The items were answered on a 7-point scale from “Very difficult” to “Very easy.” This item was derived from an item measuring ability to judge products on environmental friendliness in Bartels et al. (2009) and was adapted for sustainability.

Socio-demographics. Questions about gender, age, education, income and family composition were included in the questionnaire.

3.2.4. Data analysis procedures

Exploratory factor analysis (EFA) was conducted on the nine behavioral items. EFA is an appropriate method to analyze newly developed measures (Conway & Huffcutt, 2003), for example, to assess the number of factors. Because behaviors were measured as dichotomous variables, the factor analysis was performed on the polychoric correlation matrix (Jöreskog, 1994). EFA was conducted using the principal

components estimation method. Oblique rotation was used, as we expected correlated factors (Conway & Huffcutt, 2003). The factors were interpreted using the items with the highest loadings. Cronbach's Alpha scores of the items belonging to each factor were calculated, to assess the internal consistency of the constructs. The scores on the items belonging to each factor were averaged per respondent.

Hierarchical regression analyses (with inclusion and exclusion criteria for significance of $P_{in}=0.05$ and $P_{out}=0.10$, respectively) were conducted to investigate which factors best predicted the identified types of sustainable food behaviors. In the first block, all socio-demographic variables were included. In the second block, all domain-specific psychosocial variables were added. Finally, all food motives were included to see whether they had additional predictive value beyond the domain-specific psychosocial variables.

Next, groups of respondents were formed based on their performance of the two types of behavior. The average scores per respondent on the items for each of the factors were used to categorize the respondents into clusters. The clusters were defined a-priori, based on the average scores. Four clusters were defined: a cluster of respondents who scored above the mean on both scales, a cluster of respondents who scored below the mean on both scales and two clusters with respondents who scored below the mean on one scale and above the mean on the other scale. The clusters were profiled by chi-square cross-tabulations and analyses of variance (ANOVA) with post hoc Tukey comparisons of mean scores.

3.3. Results

3.3.1. Overview of sustainable food behavior

One meat-free day a week and eating smaller portions of meat were the most popular sustainable food behaviors in the sample, performed by 56.1% and 51.5% of the respondents, respectively. In contrast, eating less dairy (21.9%), buying organic dairy (24.8%) and buying organic meat (26.6%) were least popular. Eating less (39.4%), buying free range meat (38.2%), buying products with a sustainability label (36.9%) and buying organic fruits and vegetables (33.2%) scored in between. These percentages show that meat curtailment was performed most frequently. In contrast, curtailment of dairy consumption was much less popular, indicating the importance of product category differences among curtailment behaviors. The percentages of respondents buying sustainable food products showed less variability. Buying organic meat and organic dairy showed the lowest percentages, suggesting that price is an important

factor in the purchase of sustainable food products, since these products are relatively expensive. Product category (e.g. dairy or meat) seemed less important for making sustainable product choices, compared to curtailment.

3.3.2. Exploratory factor analysis on behavioral measures

Table 3.1. summarizes the results of the factor analysis. Based on the eigenvalue ≥ 1 criterion, the inspection of the scree plot and interpretability, a two-factor solution seemed most suitable (Conway & Huffcutt, 2003). The two factors explained 68.2% of the item variance. All items loaded higher than 0.5 on one of the factors, indicating that all items can be considered practically significant (Hair, Black, Babin, Anderson, & Tatham, 2006). Therefore, all items were considered in the interpretation of the factors. To evaluate the fit of the two-factor model, a confirmatory factor analysis using unweighted least squares was conducted. Since the factor analysis was based on the polychoric correlation matrix, the fit measures based on chi-square are not appropriate. Instead, we used the adjusted goodness of fit index (AGFI) and the standardized root mean square residual (SRMR), based on deviations between the observed and estimated correlation matrices. The AGFI of .987 and SRMR of .046 both indicated that the two-dimensional model provided a good fit (Lattin, Carroll, & Green, 2003).

Table 3.1. Items and factor loadings (structure matrix).

	Component 1	Component 2	Reliability
Factor 1 – Product choice			.812
Buying organic meat	.910	.342	
Buying organic fruits and vegetables	.905	.375	
Buying organic dairy	.888	.308	
Buying free range meat	.817	.364	
Buying products with a sustainability label	.808	.405	
Factor 2 – Curtailment			.608
Eating smaller portions of meat	.429	.832	
Eating less	.219	.797	
Eating less dairy	.283	.715	
One meat-free day a week	.379	.706	

Note. Factor loadings higher than .5 are in bold type.

Factor 1 consisted of five items relating to the choice of products with a sustainable production process. Therefore this factor was labelled “sustainable product choice.” Factor 2 was composed of four items concerning behaviors relating to eating less (from a certain product category). Therefore, this factor was labelled “curtailment.” Cronbach’s Alphas were .812 and .608, respectively. The items belonging to the product choice factor had an acceptable internal reliability (Field, 2005). The reliability of the curtailment-items was rather low. The correlation between the two factors was .407, indicating some overlap of the two behavior types. The two-factor solution was used to construct a sustainable product choice and a curtailment scale, consisting of the average scores on the respective items.

3.3.3. Predictors of sustainable product choices and curtailment

A hierarchical regression analysis on the sustainable product choice and curtailment scales showed that, in the first step, education significantly predicted product choices, whereas gender and age class predicted curtailment (see Table 3.2.). In the second step, when domain-specific psychosocial factors were included, the same socio-demographic variables remained predictive. In addition, personal food involvement, personal norm with regard to sustainability, personal norm with regard to healthy and sustainable food and subjective knowledge on sustainable food significantly predicted product-related behavior. Personal norm with regard to sustainability, social norms with regard to healthy and sustainable food and subjective knowledge on sustainable food significantly predicted curtailment. In the last step, food choice motives were included to see if they had added predictive value. For sustainable product choices, sustainability motives, home brand (negative) and price (negative) were significant predictors. Socio-demographic variables were not significant any more in the final step. Personal norms with regard to sustainability also were not significant any more, but personal food involvement, personal norm with regard to healthy and sustainable food and subjective knowledge remained significant. For curtailment, the only significant motives were sustainability motives. In addition, gender and subjective knowledge on sustainable food remained significant predictors in the final step (see Table 3.2.). The results show that, as expected, motives added predictive value beyond the domain-specific psychosocial antecedents in both models, but this additional value was largest for sustainable product choices.

Table 3.2. Regression analysis of product choices and curtailment.

Predictor	Product choices		Curtailment	
	B (s.e.)	F(df1,df2); p-value; R ² ; Adj. R ²	B (s.e.)	F(df1,df2); p-value; R ² ; Adj. R ²
(Constant)	.204 (.070)**	F(4,937)=1.191; p=.313;	.240 (.063)***	F(4,937)=7.616; p=.000;
Income	.000 (.007)	R ² =.005;	-.011 (.006)	R ² =.031;
Gender (male = 0)	.023 (.023)	R ² Adj. =.027	.098 (.021)***	R ² Adj. =.027
Age class	.003 (.010)		.022 (.009)*	
Education	.032 (.016)*		-.003 (.014)	
(Constant)	.163 (.073)*	F(11,930)=23.716;	.217 (.070)**	F(11,930)=16.308;
Income	.003 (.006)	p<.000;	-.008 (.006)	p<.000;
Gender (male = 0)	-.006 (.021)	R ² =.219;	.080 (.020)***	R ² =.162;
Age class	.001 (.009)	R ² Adj. =.210;	.021 (.009)*	R ² Adj. =.152
Education	.016 (.014)		-.011 (.014)	
Social food involvement	-.002 (.011)		.008 (.010)	
Personal food involvement	-.022 (.011)*		-.001 (.010)	
Personal norm with regard to sustainability	.071 (.015)***		.049 (.014)**	
Social norms with regard to healthy and sustainable food	.025 (.015)		.030 (.015)*	
Personal norm with regard to healthy and sustainable food	.056 (.019)**		.036 (.018)*	
Subjective knowledge on sustainable food	.030 (.010)**		.024 (.009)*	

Ability	.002	(.010)	-.006	(.009)		
(Constant)	.185	(.100)	.250	(.100)*	$F(20,921)=10.076$;	
Income	-.002	(.006)	-.008	(.006)	$p<.000$;	
Gender (male=0)	-.005	(.021)	.073	(.021)***	$R^2=.180$;	
Age class	-.005	(.009)	.016	(.009)	$R^2 \text{ Adj.}=.162$	
Education	.017	(.014)	-.008	(.014)		
Social food involvement	-.001	(.010)	.007	(.010)		
Personal food involvement	-.023	(.010)*	.004	(.011)		
Personal norm with regard to sustainability	.005	(.016)	.028	(.016)		
Social norms with regard to healthy and sustainable food	.017	(.015)	.027	(.015)		
Personal norm with regard to healthy and sustainable food	.037	(.018)*	.027	(.018)		
Subjective knowledge on sustainable food	.026	(.009)**	.024	(.009)*		
Ability	-.001	(.009)	-.009	(.009)		
Sustainability (mean)	.083	(.009)***	.023	(.009)**		
Home brand	-.019	(.005)***	-.002	(.005)		
Well-known	-.010	(.006)	-.011	(.006)		
A-brand	.000	(.005)	-.004	(.005)		
Ready-to-eat	-.007	(.005)	-.005	(.005)		
Portion size	.001	(.006)	.003	(.006)		
Price	-.016	(.007)*	.007	(.007)		
Taste	.005	(.008)	-.015	(.008)		
Healthiness	-.014	(.007)	.007	(.007)		

Note. * $p<.05$. ** $p<.01$. *** $p<.001$.

3.3.4. A priori segmentation

Respondents were categorized a priori into consumer segments based on their sustainable food behaviors.² The scores on the items belonging to the product choice factor and the curtailment factor respectively were averaged per respondent to construct two scales. The product choice and curtailment scales have been used to group the respondents into four clusters, employing a mean split of the scale distributions. Table 3.3. shows how the four clusters differed on the two scales.

Table 3.3. Cluster centroids (mean (std. dev.)) on the segmentation variables.

	Cluster			
	Unsustainers	Curtailers	Product oriented	Sustainers
Size (% of sample)	324 (34.4)	228 (24.2)	117 (12.4)	273 (29.0)
Product choice	.044 ^a (.082)	.085 ^b (.099)	.667 ^c (.220)	.695 ^c (.240)
Curtailment	.108 ^a (.124)	.659 ^b (.175)	.169 ^c (.118)	.705 ^d (.195)

Note. ^{a-d} Means with differing superscripts within rows are significantly different at $p < .05$ based on ANOVA post hoc Tukey tests.

Cluster 1 was the largest cluster, accounting for 34.4% of the sample. Respondents in this cluster had significantly lower scores on both sustainable product choices and curtailment behaviors compared to the other clusters. On average, 4.4% of sustainable product choices were performed by respondents in cluster 1, and 10.8% of curtailment (see Table 3.4.). Because of the low scores on both types of sustainable behaviors, this cluster was labelled “unsustainers.”

Cluster 2 accounted for 24.2% of the sample. Respondents in this cluster scored higher on sustainable product choices compared to cluster 1, but significantly lower than clusters 3 and 4. On average, 8.5% of sustainable product choices were performed by respondents in cluster 2. This cluster scored significantly higher on curtailment behaviors than clusters 1 and 3, but lower than cluster 4. On average 65.9% of the

² In addition, a two-step cluster analysis was performed which showed that a four-cluster solution fits the data best. The resulting clusters were similar to the a priori clusters. The sizes of the clusters changed slightly (with cluster sizes of 35.9%, 31.7%, 19.0% and 13.4% respectively), with less respondents in the sustainers cluster and more respondents in the curtailment and the product-oriented clusters compared to the a priori clusters. Also, the profiling variables showed similar differences across the clusters, with two exceptions: education level and household income were not significantly different across the clusters.

four curtailment behaviors was performed by the respondents in cluster 2, but large differences existed between the individual items. Because of the low percentage of sustainable product choices and the relatively high percentage of curtailment behaviors this cluster was labelled “curtailers.”

Cluster 3 was the smallest cluster, accounting for 12.4% of the sample. This cluster scored significantly higher on product choices than clusters 1 and 2. The average percentage of sustainable product choices was 66.7. Regarding curtailment behaviors cluster 3 scored significantly higher than cluster 1 but lower than clusters 2 and 4. The respondents in this cluster performed 16.9% of curtailment behaviors. Because of the relatively high performance of sustainable product choices and the relatively low performance of curtailments this cluster was labelled “the product-oriented.”

Cluster 4 accounted for 29.0% of the sample. Respondents in this cluster displayed the highest amount of sustainable food behaviors in both categories (although the performance of sustainable product choices did not differ significantly from cluster 3). On average, 69.5% of sustainable product choices were performed by respondents in this cluster and 70.5% of curtailments. As this cluster scored high on both factors, this cluster was labelled “sustainers.”

3.3.5. Differences in food motives

In the total sample, the highest perceived importance was related to food choice motives of taste, price and healthiness, whereas the lowest importance was related to sustainability motives and the “ready-to-eat” motive (Table 3.4). For the individual clusters, similar results were found with regard to the most important motives. For unsustainers, product-oriented and sustainers, taste scored highest followed by price and healthiness. Among curtailers, price and taste were reversed. The clusters differed more in the motives they found least important (see Table 3.4).

Looking at significant differences in scores between the segments, it became clear that all sustainability motives showed more dispersion among the segments than the other food motives. Sustainability motives were most important to sustainers, followed by the product-oriented, curtailers and unsustainers. Healthiness was more important for sustainers and curtailers compared to unsustainers. Price showed a different pattern, with curtailers attaching significantly more importance to price than the product-oriented and sustainers. Importance attached to the other included motives did not differ significantly across the clusters (see Table 3.4).



Table 3.4. Profile of the clusters on food motives.

Food Motive factors	Cluster			
	Unsustainers	Curtailers	Product-oriented	Sustainers
Sustainability (mean)	4.43 ^a	5.12 ^b	5.95 ^c	6.51 ^d
Home brand	5.89 ^a	6.21 ^a	5.94 ^a	6.03 ^a
Well-known	6.99 ^a	6.87 ^a	7.21 ^a	6.87 ^a
A-brand	5.01 ^a	4.98 ^a	5.63 ^b	5.54 ^{a,b}
Ready-to-eat	4.51 ^a	4.43 ^a	4.76 ^a	4.63 ^a
Portion size	6.68 ^a	7.03 ^a	7.14 ^a	6.88 ^a
Price	8.13 ^{a,b}	8.50 ^a	7.86 ^b	7.90 ^b
Taste	8.57 ^a	8.44 ^a	8.33 ^a	8.31 ^a
Healthiness	7.12 ^a	7.56 ^b	7.55 ^{a,b}	7.87 ^b

Note. ^{a-d} Means with differing superscripts within rows are significantly different at $p < .05$ based on ANOVA post hoc Tukey tests.

3.3.6. Differences in norms, food involvement, knowledge and ability

Unsustainers scored lowest on the items measuring personal norms with regard to sustainable behavior, and social and personal norms with regard to healthy and sustainable eating behavior. Sustainers scored highest on these items. The same pattern appeared for subjective knowledge with regard to sustainable food. In general, respondents evaluated themselves as having an average (i.e., mid-scale) knowledge of food and sustainability and average ability to judge food products on the sustainability of production. Unsustainers and curtailers reported the lowest ability and the product-oriented and sustainers the highest. Unsustainers and product-oriented scored significantly lower on social aspects of food involvement than sustainers. Scores on personal food involvement did not differ significantly across the clusters (see Table 3.5.).

3.4. Discussion

This study adds to the discussion on sustainable food consumption by identifying two behavioral strategies: sustainable product choices and curtailment. Both have been empirically distinguished in this study and the results show that consumers differ in the main strategy they employ. Most of the existing literature focuses exclusively on the identification of consumers' levels of sustainable (food) attitudes or behaviors. This study shows that consumers differ not only in the level of sustainable food behaviors, but also in the type (sustainable product choices or curtailment) of sustainable food behaviors they conduct. Therefore, this study underpins the importance of focusing on both the *levels* (quantity) of sustainable food consumption as well as on the *types* (quality) of behavior that consumers use.

Table 3.5. Profile of the clusters on norms, food involvement, subjective knowledge and ability.

	Unsustainers	Curtailers	Product-oriented	Sustainers
Personal norm sustainable	-.487 ^a	-.079 ^b	.183 ^c	.565 ^d
Personal norm healthy and sustainable food	-.509 ^a	-.048 ^b	.152 ^b	.579 ^c
Social norm healthy and sustainable food	-.421 ^a	-.022 ^b	.154 ^b	.452 ^c
Subj. knowledge sustainable food	3.07 ^a	3.42 ^b	3.79 ^c	4.15 ^d
Ability sustainable products	3.11 ^a	3.29 ^a	3.67 ^b	3.92 ^b
Social food involvement	-.104 ^a	-.029 ^{a,b}	-.111 ^a	.196 ^b
Personal food involvement	.028 ^a	.051 ^a	-.088 ^a	-.037 ^a

Note. ^{a-d} Means with differing superscripts within rows are significantly different at $p < .05$ based on ANOVA post hoc Tukey tests.

3.4.1. Behavioral strategies

One of the main contributions of this study is the empirical distinction of behavioral strategies within a broad range of sustainable food behaviors in a number of product categories. Many initiatives exist to achieve a more sustainable diet (see, for example de Boer et al., 2014), but research on who to approach with what strategy is still in its infancy. In the current study, two behavioral strategies have been identified based on the literature: sustainable product choices and curtailment. These strategies were inspired by the energy conservation and transportation literature (e.g. Barr et al., 2005; Jansson et al., 2009) as well as by distinctions made implicitly and explicitly in the sustainable food consumption literature. However, to our knowledge, these strategies have never been empirically tested in the food domain. A recent study by de Boer et al. (2014) has identified several strategies toward meat reduction based on existing initiatives. Although predictors of the strategies were investigated, the empirical distinction between the strategies was not tested. One of their included strategies is “less but better,” defined as “smaller portions using meat raised in a more sustainable manner.” In the current study the importance of distinguishing the components “less” and “better” is shown, as our data demonstrated a conceptual and empirical distinction between sustainable product choices and curtailments.

In addition, the current study provides insights into what factors may determine or motivate these different types of sustainable food behaviors and thereby provides a more complete view on, and increased understanding of sustainable food behaviors. Determinants of the two types of behavior only partly overlap. Sustainability motives and subjective knowledge on sustainable food significantly predict both types of sustainable food behavior. In addition, importance of two other food choice motives, price and home brand (negatively) predict sustainable food choices. This result suggests that price subsidies for sustainable food products may affect consumers’ food product choices but not curtailment. Furthermore, both personal norms with regard to healthy and sustainable food, and food involvement positively affect sustainable food choices. On the other hand, curtailment is associated with being female. This result suggests that curtailment most effectively can be accomplished by interventions targeted at women. Overall the results suggest that food choice motives are a useful addition to psychosocial variables in predicting sustainable food behaviors. Moreover, the results indicate that socio-demographic variables are still important to include in research on curtailment – despite of discussions and empirical results that questions their usefulness in sustainability-related food behavior (see Dagevos, 2005; Verain et al., 2012).

Interventions stimulating consumers towards more sustainable food behaviors should aim at increasing the importance attached to sustainability motives, subjective knowledge, food involvement and personal norms towards health and sustainability. This might be accomplished by agenda-setting interventions, for example, in social marketing efforts and social media.

3.4.2. Sustainable consumer segments

Four consumer segments have been identified that differ significantly in both the level and the type of sustainable food behavior. The segments also differ from each other in the importance they attach to a range of food motives, in psychosocial characteristics and in socio-demographic characteristics. Product-oriented consumers and curtailers differ from each other in that the product-oriented have a higher personal norm towards sustainable behavior, and have a higher ability to judge sustainably produced food, and subjective knowledge on sustainable products. Alternatively, curtailers are more often female and older than unsustainers and product-oriented, and are more often lower educated with lower incomes compared to sustainers. These results suggest that the product-oriented are most similar to sustainers in terms of motives and psychosocial characteristics, whereas curtailers are most similar to sustainers in terms of socio-demographics.

The identification of segments differing in the degree of sustainable behavior is in accordance with previous work (e.g. Barr et al., 2005; Verain et al., 2012). The distinction of food consumer segments differing in the type of behavior they employ (sustainable product choices or curtailment) adds to the existing literature. Vanhonacker et al. (2013) conclude, for example, that consumers prefer to consume more sustainable types of meat as compared to eating meatless meals. The current study gives a more nuanced picture by showing that consumer segments can be identified based on differences in both these behaviors. Herewith our findings partly oppose the work of Kaiser (1998) who argues that ecological behaviors can be ordered on a uni-dimensional difficulty scale. Our results show that it is possible to score both high on one dimension and low on the other, so consumers may differ on two dimensions.

Our findings are similar to the work of Jansson et al. (2009), who identified consumer segments based on pro-environmental purchases (organic and environmentally labeled products) and curtailment behaviors (substitution of car use by other means of transportation). Three consumer segments were found: non-greens, curtailers and ecovators (ecological innovators). The current study found very similar consumer segments for the domain of food, although an additional segment has been

identified that combined curtailment and sustainable product purchases. Although a similar distinction (curtailment vs. sustainable purchases) as for energy conservation has been empirically identified, future research is needed to find out to what extent this distinction is similar for various domains. Curtailment and/or sustainable purchases may be part of a broader sustainable lifestyle, transcending domains, and it would be interesting for policy makers to get insight into spill-overs from one domain to another (e.g. Thøgersen & Ölander, 2003).

The current research underpins and adds insights into the theoretical routes toward more sustainable, plant-based diets that have been discussed by De Bakker and Dagevos (2012). The first route that they identify is called “sustainability by stealth” and involves the acceptance of sustainable food innovations that are not very noticeable (e.g. hybrid meats). This route is highly technology-based and might be an interesting one to approach unsustainers, as their involvement is low. The second route of “moderate involvement” implies social debate and small practical changes in food patterns, such as eating smaller portions of meat or having a meatless day once in a while. This route is very much about curtailment and therefore, relevant for curtailers. The last and “strongest” route of “cultural change” entails two aspects: eating little or no meat, and taking production methods, animal welfare or the environment into account when making food choices. The route of cultural change as explained by De Bakker and Dagevos (2012) includes both curtailment and sustainable product choices. Cultural change requires high involvement, high awareness and a high level of ethical food motives, as is the case among both the product-oriented and sustainers. The current study is very much in line with these routes, but the identification of a product-oriented segment implies that consumption of sustainable food products is not necessarily part of a food style including both curtailment (low meat consumption) and sustainable product choices (organic meat) such as described in the route of cultural change. A possible explanation for the existence of a consumer segment low in curtailment and high in sustainable product choices is the low awareness of the sustainability impact of animal products (Tobler et al., 2011; Vanhonacker et al., 2013). An alternative explanation could be licensing (e.g. Mazar & Zhong, 2010): consumers may feel entitled to eat a lot of meat because they already contribute to more sustainable food consumption by purchasing more sustainably produced alternatives. A third explanation could be the encountered barriers toward curtailment, such as a lack of cooking skills and a negative perception of plant-based meat substitutes.

3.4.3. Limitations and future research

To our knowledge, this is the first study in the sustainable food context in which the theoretical distinction between product choices and curtailment has been tested empirically. Therefore, this study should be seen as exploratory and can serve as a starting point for future research that could validate or broaden our findings. A limitation of the present study is the measurement of behaviors as dichotomous variables. A finer graded behavioral measurement could help to gain more insights into behavioral frequency differences across segments. In addition, future research should include additional curtailment items to improve the internal reliability of the curtailment factor. A possible explanation for the weak reliability could be the diversity of items included to measure curtailment. Several forms of curtailment (e.g. one meat-free day or smaller portion sizes) in several product categories (meat and dairy) have been included. Consumers may have different preferences for different types of curtailments (see also De Boer et al., 2014). A meatless day and a reduction in portion size can involve very distinct considerations as a meatless meal is more a qualitative choice whereas a small piece of meat is about the quantity consumed (De Boer et al., 2014). Preferences may also vary across product groups. In a recent paper, De Boer et al. (2014) distinguish meatless days and smaller portions of meat as two separate strategies toward meat reduction. The correlation between the two strategies is found to be low. They conclude that these strategies are complementary as they appeal to overlapping but partly different consumer segments. Based on their findings, the identification of several forms of curtailment behaviors seems beneficial in understanding and targeting a range of consumer segments.

Motivations behind curtailments and sustainable product choices remain to be investigated. Even if consumers perform the same behavior, motivations for these behaviors might differ (Verain et al., 2015). To effectively promote sustainable food consumption, insight into these motivations could be helpful. In the current research motivations have been questioned only for food choices in general, and not for the sustainable behaviors specifically and therefore it is impossible to affirm whether sustainable food behaviors are purposefully conducted as a strategy toward more sustainable food consumption. Health reasons may, for example, be underlying motives for curtailment or the choice for sustainable products (Latvala et al., 2012; Magnusson, Arvola, Hursti, Aberg, & Sjöden, 2003), although the finding that the importance of healthiness in food choices is not a significant predictor of both types of sustainable behaviors makes this reasoning unlikely. Financial considerations might be another

reason for curtailing. Although price is not found to be a significant predictor of curtailment behavior, curtailers had more often lower incomes and valued price more than the other segments.

Other important factors influencing sustainable food behavior – be it product choice or consumption curtailment – that should be included in future research are habits as well as contextual factors. Although it is beyond the scope of this study, we fully acknowledge the importance of both habits and an enabling environment to sustainable eating behavior (see also Dagevos & de Bakker, 2015). At a less general level, interesting issues to include in future research are cooking skills, nutritional knowledge, perceptions of meat substitutes or awareness of environmental consequences of food choices.

Path analysis would be a valuable addition to investigate structural relationships among the predictors. For example, in addition to socio-demographic and psychosocial variables, food choice motives explain sustainable food behaviors but the motives might be determined by socio-demographic and psychosocial variables at the same time. We leave this possibility to be studied in future research.

A final suggestion for future research is to conduct longitudinal research to investigate causalities and transitions between segments. The relatively high correlation between sustainable food product purchases and curtailment suggests a certain extent of overlap between the two types of behavior, and could possibly lead to transitions between these behaviors. Positive spill-over effects can occur if sustainable food behaviors become part of a sustainable (food) lifestyle, but as indicated before, negative spill-over (licensing) is also possible (e.g. Thøgersen & Ölander, 2003). Research on transitions between the two behavioral categories could further explore how to build on the spill-over literature by investigating when and why transitions occur and how transitions could be used to encourage sustainable food behavior.

In short, this research suggests that it is important to focus on stimulating consumption of sustainably produced products as well as on changes in dietary patterns (curtailment). In accordance with recent work of De Boer et al. (2014) we conclude that different behavioral strategies toward more sustainable food consumption appeal to overlapping but different consumer segments, and are complementary in their contribution to more sustainable food consumption.

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Chapter 4

Consumer segmentation based on food-category attribute importance: The relation with healthiness and sustainability perceptions



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Abstract

Sustainability issues pose an important challenge to contemporary dietary patterns. Scientists more and more emphasize the importance of consumers shifting their dietary patterns towards consumption levels that are not only healthy but simultaneously consider sustainability. Therefore, the aim of the current study is to identify consumer segments based on importance consumers attach to a range of food-category attributes, with a special focus on sustainability attributes. In addition, the study aims to explore differences between the identified segments in their perceptions of synergy between healthiness and sustainability of food products. Three segments were identified: a pro-self, an average and a sustainable conscious segment. Synergy between perceptions of healthiness and sustainability differed across segments. The findings indicate the importance of taking food category differences into account. In addition, this study shows that importance attached to food-category attributes forms a valuable segmentation basis, as the segments relate to the perception of healthiness and sustainability of products. Implications for future studies are presented.

4.1. Introduction

Food consumption patterns in affluent societies are increasingly posing sustainability challenges (Reisch, Eberle, & Lorek, 2013). Sustainability is a complex concept comprising a range of environmental issues (e.g. transportation, and greenhouse gas emissions), animal welfare issues and fair trade (Aschemann-Witzel, 2015; Reisch et al., 2013; Van Dam & van Trijp, 2011). Since several decades, the importance of healthy diets is recognized in the light of increasing obesity levels and resulting chronic health problems (Ng et al., 2014). Sustainability of food consumption, though, is still often neglected. Scientists more and more emphasize the importance of consumers shifting their dietary patterns towards consumption levels that are healthy but simultaneously meet sustainability criteria (e.g. Aschemann-Witzel, 2015).

Consumer demand determines both the healthiness of a diet through nutritional intake and the sustainability of products and production systems (Grunert, 2011; Heller, Keoleian, & Willett, 2013). Therefore, consumer food choices are crucial in shifting diets towards more healthy and sustainable consumption patterns. In order to better understand and influence consumer food choices, it is important to gain insights into underlying motivations for these choices (Geeroms, Verbeke, & Kenhove, 2008).

Lifestyles are becoming more and more diverse (Bernués, Ripoll, & Panea, 2012) and therefore it is important to take the heterogeneity of consumers into account (Dagevos, 2005). One way to deal with heterogeneity is through consumer segmentation. Segmentation entails the classification of consumers into groups that are rather homogenous on one or more key characteristics (Wedel & Kamakura, 2000), such as motivations (Geeroms et al., 2008). Three levels of food choice factors, namely general food choice motives, food-category attribute importance, and food perceptions will be considered next.

4.1.1. Food choice motives and food attributes

Food choice motives and the related importance consumers attach to product attributes are valuable segmentation bases (Grunert, 1995; Haley, 1968; Jadczaková, 2013; Onwezen et al., 2012; Van der Zanden, van Kleef, de Wijk, & van Trijp, 2014), as they determine to a large extent what food choices consumers make and to which arguments and information they are sensitive (Bellows, Alcaraz, & Hallman, 2010; Bernués, Olaizola, & Corcoran, 2003b). Importance of food attributes indicate people's motives underlying their food choices (Grunert, 1995; Onwezen et al., 2012). Therefore, insights gained by segmenting consumers based on these importance ratings can help promote healthy and sustainable food consumption effectively.

Among the many product attributes influencing food consumption, taste, price and healthiness are often found to be among the most important (e.g. *Insch & Jackson, 2014; Markovina et al., 2015; Onwezen & Bartels, 2011; Sautron et al., 2015*). Generally, sustainability is considered as less important (*Markovina et al., 2015; Moser, Raffaelli, & Thilmany-McFadden, 2011; Sautron et al., 2015*), although its perceived importance differs across consumers (*Bond, Thilmany, & Keeling Bond, 2008*). Attributes differ on two important aspects: social orientation (pro-self versus altruistic, ethical or pro-social motives) and the time scale on which the consequences occur (immediately or on the long-term) (*Aschemann-Witzel, 2015; Chryssohoidis & Krystallis, 2005; Gad Mohsen & Dacko, 2013*). Because of differences in social orientation and time perspective, attribute judgements are often conflicting (*Aschemann-Witzel, 2015*). In stimulating healthy and sustainable food consumption, health and sustainability should get priority over (or should be in line with) the more pro-self and short-term attributes (e.g. taste and price). This makes it important to study health and sustainability attributes in the broader context of other possibly conflicting attributes, and to study sources of conflicts and possibilities for synergy (*Aschemann-Witzel, 2015; Davies, 2011*).

4.1.2. Food categories

Since consumer motives might differ across food categories, it is important to consider differences in attribute importance across food categories. *Andersen and Lund (2014)* argue that consumer perceptions of organic products compared to conventional variants in terms of product quality and price differ across food categories. Another argument to consider food categories is that category-specific attributes can be identified such as animal welfare, that are relevant in one category but not in another category (*Bernués, Olaizola, & Corcoran, 2003a*). Attribute segmentations have mainly been conducted for food in general (*Bellows et al., 2010; Kornelis, van Herpen, van der Lans, & Aramyan, 2010; Onwezen et al., 2012*) or one specific food category (*Font-i-Furnols & Guerrero, 2014; Realini et al., 2014*). Attribute segmentation at the food-category level could be helpful as it compromises between too general insights gained from studies of overall food consumption and too specific insights from studies of food consumption in a specific context or category.

4.1.3. Food perceptions

Food choices not only depend on attribute importance but also on the perceived extent to which products possess the relevant attributes (*Grunert, 2005*). Motives and attributes mediate between abstract consumer values and concrete product perceptions

(Brunsø, Scholderer, & Grunert, 2004). In the context of this study, it is specifically interesting to gain insights into perceptions of healthiness and sustainability of certain products, the perception of synergy between health and sustainability, and the way these perceptions relate to the importance of food category attributes. Perceptions of healthiness and sustainability showing a high level of synergy among certain consumer segments could be used to stimulate healthy and sustainable food choices effectively.

4.1.4. Study overview

The three levels of abstraction considered above form the basis of the current research and are presented in Figure 4.1. The middle level will be used to segment consumers into homogenous groups based on food-category attribute importance. Subsequently, these segments will be linked to both more abstract general food choice motives and more concrete healthiness and sustainability perceptions of specific food products.

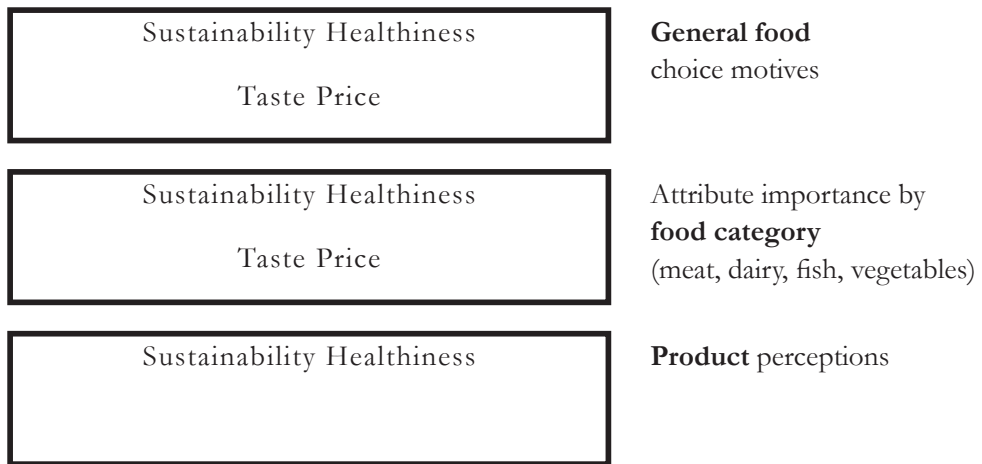


Figure 4.1. Different layers of abstraction in the research.

The current study aims to explore importance of sustainability attributes related to a broader set of food attributes that jointly determine food choices at the food-category level. Since attributes are not valued equally by everyone (Henchion, McCarthy, Resconi, & Troy, 2014) consumer segmentation can provide insights into differences in (food category) attribute importance and perception across consumer groups. Although segmentation studies on importance ratings of product attributes



have become increasingly popular, the interaction between healthiness and sustainability attributes has received limited attention. Healthy and sustainable behaviors are very much related because (1) part of these behaviors can be perceived as healthy and sustainable simultaneously, e.g. organic or vegetarian food consumption (Fox & Ward, 2008; Kareklas, Carlson, & Muehling, 2014; Magnusson, Arvola, Hursti, Åberg, & Sjöden, 2003), (2) both provide benefits in the long term, and therefore require motivation and capabilities to resist tempting options with short-term benefits (Aschemann-Witzel, 2015), and (3) both are credence attributes, implying that trust and confidence play a role in judging these attributes (Grunert, 2005; Henschion et al., 2014). Pelletier, Laska, Neumark-Sztainer and Story (2013) showed that young adults placing higher importance on sustainable food production generally have better quality dietary patterns. Because of the similarities between healthiness and sustainability we expect those motives to be strongly related. Sautron et al. (2015) found that health and several sustainability dimensions were highly correlated and identified a higher-order factor combining health and sustainability. A strong correlation would imply that consumers who value healthiness also value sustainability, and therefore synergy gains could be obtained when both aspects are taken into account simultaneously in marketing and communication campaigns (Aschemann-Witzel, 2015).

4.2. Materials and methods

4.2.1. Data collection

A representative sample (for gender and age) of Dutch adult consumers was selected through a professional research agency. Data were collected in November 2011, using an online survey. 942 Respondents were included in the analysis of which 50.4% were male. Age ranged from 18 to 65 years ($M=42.3$, $SD=13.6$); 20.1% had a low education level, 41.4% a medium education level and 38.5% a high education level. 28,3% lived in single households.¹

4.2.2. Segmentation variables

Part of the questionnaire, measuring the importance of a range of food-category attributes, included several sustainability attributes (e.g. sustainability, environmental friendliness, waste, origin, transportation distance, animal friendliness), healthiness, price

¹ The total Dutch population in 2011 consisted of 50.5% females and 49.5% males, with a mean age of 40.3 years. 31.7% had a low education level, 40.4% a medium education level and 27.8% a high education level. 36.4% lived in single households.

and taste. Price and taste have been included as they are the most important motives for many consumers; in addition, taste and price can form barriers for healthy and sustainable product choices (e.g. Magnusson, Arvola, Hursti, Åberg, & Sjöden, 2001; Raghunathan, Naylor, & Hoyer, 2006; Schuldt & Hannahan, 2013). The food categories of dairy, meat, vegetables and fish were selected based on dietary guidelines proposing to eat less animal-based and more plant-based products, to the benefit of both healthy and sustainable contemporary western diets (e.g. Health Council of the Netherlands; 2011, Reisch et al., 2013; Van Dooren, Marinussen, Blonk, Aiking, & Vellinga, 2014). Meat and dairy (animal-based) were included as these food categories cause the highest environmental burden and therefore, meat and dairy consumption should be reduced (e.g. Westhoek et al., 2014). In addition, fish (animal-based) has been added as it is an interesting and ambiguous food category. Fish consumption is positively related to health, but negatively to sustainability (Health Council of the Netherlands, 2011). Vegetables have been included as a plant-based category, as for a large majority of consumers an increase in vegetable consumption would be beneficial for their health (e.g. Joffe & Robertson, 2001). In addition, vegetables were included to complement the other categories that are often consumed at dinner time in the same context. Therefore the four categories are suitable to being compared in terms of motivations.

The generic formulation of questions measuring attribute importance was: “I think it is important that [food category X] is [attribute],” for example, “I think it is important that dairy is sustainable.” In total, 55 items were included, 13 or 14 for each of the food categories². The items were all measured on seven-point Likert scales with endpoints labelled as “Totally disagree” and “Totally agree.” The food-category attribute ratings were used as segmentation basis in the cluster analysis.

4.2.3. Profiling variables

Profiling variables were included to describe characteristics of the segments. General food choice motives, product perceptions related to healthiness and sustainability, and socio-demographic and background characteristics (gender, age, education, income and household type) were used as profiling variables. The profiling variables allow for placing the attribute ratings of the food categories in a broader framework of both more abstract general food choice motives and more concrete product perceptions (see Figure 4.1).

² For the categories of dairy, meat and fish 14 items were included, for the category of vegetables 13 items were included.

Motives. Ten general food choice motives were included in the questionnaire: price, taste, healthiness, and seven sustainability motives (sustainability, organic, containing a quality label, animal friendly, environmentally friendly, origin and regional). These motives were based on the Food Choice Questionnaire (Steptoe, Pollard, & Wardle, 1995) and the ethical food choice motives added by Lindeman and Väänänen (2000). The respondents were asked to indicate with a mark from 1 to 10 (1=“totally no reason,” 10=“important reason”) to what extent these motives are decisive in buying a food product.

Perceptions. Perceptions were measured using pictures of food products. For each of the products, one regular and one sustainable alternative (organic, free range, local, or with a sustainability label) were presented (e.g. a regular broccoli and an organic broccoli). The respondents viewed the pictures three times in random order. One time, they were asked to click on the pictures that they perceived as “healthy but not sustainable,” one time they were asked to click on the pictures that they perceived as “sustainable but not healthy,” and one time they were asked to click on the pictures that they perceived as “healthy and sustainable.”

In order to make the product perceptions feasible for analysis, two new variables were computed based on these three questions. A “healthy” variable was computed by giving a value of 1 if the product was indicated as either “healthy but not sustainable” or “healthy and sustainable,” and 0 otherwise. The sustainability variable was given a value of 1 if the product was indicated as either “sustainable but not healthy” or “healthy and sustainable,” and 0 otherwise.

4.3. Results

4.3.1. Exploration of food-category attributes

Data reduction was applied on the 55 single items, to avoid redundancy while defining segments. Exploratory factor analysis (EFA) using principal components estimation was conducted on the 13 or 14 ratings for each of the four food categories separately to estimate the underlying factors. Oblique rotation was used, as correlation between factors was expected. Various solutions were considered and evaluated based on the eigenvalues, the inspection of the scree plot and interpretability. Our data reduction was checked with consecutive confirmatory factor analysis (CFA) in which we first tested a common structure for all four food categories, then relaxing this restricted model.

The factor analysis on the food-category attribute ratings resulted in two factors for each of the food categories (eight factors in total). The total item variance explained for each food category was 69.6% for dairy, 69.4% for meat, 72.6% for fish and 67.6% for vegetables. The results of the exploratory factor analysis were confirmed by various CFAs as follows. A CFA model with two factors explaining all 55 items yielded unsatisfactory fit³ (RMSE=0.14, NNFI=0.95, CFI=0.95, SRMR=0.06, GFI=0.50). Next, we estimated an eight-factor model in which each pair of factors explained the items associated with a single food category but were unrelated to the items associated with the other food categories. This model yielded a better fit (RMSE=0.10, NNFI=0.97, CFI=0.97, SRMR=0.04, GFI=0.64) but was still unsatisfactory. Finally, we estimated separate CFA models for each food category, each with two factors. Each of these models yielded satisfactory fit, except for RMSE⁴, and comparable factor loadings.

In the final solution, two factors have been identified for each of the four food categories, one factor capturing all sustainability items (e.g. sustainable, environmentally friendly, little waste, from The Netherlands, small transportation distance, animal friendly), and one pro-self factor capturing taste, price and healthiness (see Table 4.1.). All constructs had a good reliability. For dairy, Cronbach's Alpha scores for the sustainability factor and the pro-self factor were .950 and .821, respectively. For meat these scores were .951 and .786, for fish .957 and .859, and for vegetables .940 and .788. The correlations between the sustainability and the pro-self factors were .332 for dairy, .277 for meat, .412 for fish and .325 for vegetables. The factor scores were then centered per respondent, in order to cancel out response tendencies. In other words, each respondent's factor scores were mean centered by subtracting the respondent's average factor score. This procedure, ipsatization, leads to a zero average across all eight factors for each individual (Fischer & Milfont, 2010).

³ A Root Mean Square Error (RMSE) below .07 (Steiger, 2007) and a Standardized Root Mean Square Residual (SRMR) below .08 indicate satisfactory model fit (Hu & Bentler, 1999). Comparative Fit Index (CFI) and Non-Normed Fit Index (NNFI) indices of at least .90 indicate a satisfactory model fit (Hu & Bentler, 1999).

⁴ Dairy: RMSE=0.09, NNFI=0.98, CFI=0.98, SRMR=0.03, GFI=0.93; Meat: RMSE=0.09, NNFI=0.98, CFI=0.98, SRMR=0.03, GFI=0.93; Fish: RMSE=0.11, NNFI=0.96, CFI=0.98, SRMR=0.04, GFI=0.91; Vegetables: RMSE=0.11, NNFI=0.96, CFI=0.98, SRMR=0.04, GFI=0.91.

Table 4.1. Items and Factor Loadings (Pattern Matrix) of the four EFAs.

	Dairy		Meat		Fish		Vegetables	
	1	2	1	2	1	2	1	2
Sustainable	.912	-.075	.898	-.039	.889	-.008	.908	-.055
Environmentally friendly	.911	-.043	.891	-.011	.872	.042	.885	-.019
Little waste	.700	.139	.646	.211	.645	.171	.669	.102
From the Netherlands	.664	.087	.728	-.023	.803	-.093	.767	-.021
Little transportation	.844	-.079	.863	-.081	.884	-.108	.869	-.069
Animal friendly (meat, dairy)/caught sustainably (fish) / from the season (vegetables)	.839	.065	.817	.060	.885	-.003	.624	.161
Animals have walked outside (dairy, meat)/from animals on the “Fish guide” (fish)	.795	.035	.828	.044	.857	-.041	-	-
That my eating/drinking is sustainable	.909	-.055	.901	-.079	.896	.016	.913	-.046
Sustainability label	.889	-.196	.877	-.192	.889	-.086	.877	-.167
Little antibiotics (dairy, meat, fish)/ little pesticides (vegetables)	.723	.107	.743	.111	.706	.161	.721	.137
Healthy and sustainable	.747	.186	.780	.159	.743	.228	.788	.105
Healthy	.241	.747	.278	.684	.140	.826	.221	.729
Tasty	-.027	.894	-.057	.896	-.026	.913	-.033	.894
Affordable	-.059	.865	-.064	.872	-.034	.866	-.063	.840

Note. Factor loadings higher than 0.5 in bold type.

Note. The “Fish guide” is developed by the Good Fish Foundation in which Dutch and Belgium fish and seafoods are rated on their sustainability.

4.3.2. Segmentation based on food-category attributes

In order to identify subgroups of consumers with similar patterns of importance ratings of food-category attributes, a two step cluster analysis was performed in SPSS 19.0. The mean-centered factor scores of the eight identified factors were used as segmentation variables. First, a hierarchical agglomerative clustering procedure defined the number of clusters and the cluster centroids (Ketchen & Shook, 1996). Log-likelihood was used as distance measure to successively merge cases and clusters with the smallest distance between values of the segmentation variables (SPSS Inc., 2010). Second, a non-hierarchical (*k*-means) approach was used to group respondents into the optimal number of clusters (SPSS Inc., 2010). The centroids of the sub-clusters found in the first step were used as initial starting points (Hair, Black, Babin, Anderson, & Tatham, 2006; Ketchen & Shook, 1996). Merging of clusters may depend on the input order of the cases (SPSS Inc., 2010). To minimize order effects, the cases were ordered randomly 10 times and a cluster analysis was run on each of the resulting data sets (Wedel & Desarbo, 2002; Onwezen et al., 2012). Based on a combination of the lowest Bayesian Information Criterion (BIC) in the 10 runs, the agglomeration schedule and interpretability, the final cluster solution was chosen. Three distinct segments with relatively homogenous importance ratings were identified as the optimal solution. The cluster centroids on the mean centered factor scores (individual mean subtracted) are shown in Table 4.2.

Cluster 1 was the smallest cluster and consisted of 15.9% of the sample. Cluster 1 was characterized by relatively low scores on the sustainability factors in all food categories. In contrast, they had relatively high scores on the pro-self factors. This indicated that pro-self attributes such as price, healthiness and taste were relatively more important for this cluster than sustainability attributes. Therefore, this cluster was labelled the “pro-self” cluster. Cluster 2 represented 39.4% of the sample. Respondents in this cluster attached around average importance to both the pro-self factors and the sustainability factors for all food categories, and therefore this cluster was called the “average” cluster. Cluster 3 was the largest cluster, containing 44.7% of the respondents. Respondents in this cluster attached relatively high importance to the sustainability attributes while on the pro-self factors they scored relatively low. Therefore, this cluster was labelled “sustainable conscious consumers” (or “conscious consumers” in short). The identified clusters did not differ significantly in their socio-demographic profiles (gender, age, education, household income and household type).

Table 4.2. Cluster centroids.

	Cluster		
	Pro-self Mean (sd)	Average Mean (sd)	Conscious Mean (sd)
N	150	371	421
Dairy_Sustainable	-0.93 ^a (.44)	-0.06 ^b (.48)	0.38 ^c (.35)
Dairy_Healthy/Tasty/Affordable	0.93 ^a (.45)	0.15 ^b (.68)	-0.46 ^c (.54)
Meat_Sustainable	-0.90 ^a (.42)	-0.12 ^b (.46)	0.43 ^c (.38)
Meat_Healthy/Taste/Affordable	0.95 ^a (.46)	0.14 ^b (.68)	-0.47 ^c (.56)
Fish_Sustainable	-0.85 ^a (.41)	-0.18 ^b (.48)	0.46 ^c (.35)
Fish_Healthy/Tasty/Affordable	0.92 ^a (.51)	-0.08 ^b (.85)	-0.25 ^c (.44)
Vegetables_Sustainable	-0.96 ^a (.43)	-0.07 ^b (.53)	0.40 ^c (.34)
Vegetables_Healthy/Tasty/Affordable	0.84 ^a (.84)	0.22 ^b (.64)	-0.49 ^c (.50)

Note. ^{a-c} Different superscripts indicate significantly different means in each row following ANOVA post-hoc Tukey tests at $p < .05$.

4.3.3. Profiling on general food choice motives

Table 4.3. shows average absolute scores of the clusters with regard to the general food choice motives. Taste was the most important motive for all clusters, followed by price and healthiness. Interestingly, price and taste were by far the most important motives in the pro-self cluster, but the distance to healthiness was smaller in the other two clusters. Sustainability-related motives did not appear to be the main motives for any of the clusters, although conscious consumers scored relatively high on these motives and pro-self consumers low (see Table 4.3.).

For all general food motives, significant differences between clusters have been found. The pro-self cluster had the lowest ratings and the conscious cluster had the highest ratings on all sustainability motives (sustainable, animal friendly, origin, environmentally friendly, label, regional, organic). This is in line with the findings concerning the food-category attribute ratings. For healthiness, a similar pattern was observed as for the sustainability items, although the healthiness scores for the average and conscious clusters did not differ significantly. This finding contrasted the food category level findings, as healthiness belonged to the pro-self factors. Price and taste showed the opposite pattern compared to sustainability and healthiness. Pro-self consumers scored significantly higher on price than the other segments and the conscious cluster scored significantly lower on price than the other segments. For taste, the pro-self and average clusters scored significantly higher than the conscious cluster. The results for price and taste were in accordance with the food-category importance ratings.

Table 4.3. Profiling on food choice motives.

	Cluster		
	Pro-self	Average	Conscious
Taste	8.79 ^a	8.61 ^a	8.15 ^b
Price	8.67 ^a	8.21 ^b	7.84 ^c
Healthiness	6.72 ^a	7.57 ^b	7.71 ^b
Sustainable	3.81 ^a	6.09 ^b	6.80 ^c
Animal friendly	3.28 ^a	5.72 ^b	6.77 ^c
Origin	3.02 ^a	5.27 ^b	6.20 ^c
Environmentally friendly	2.97 ^a	5.65 ^b	6.62 ^c
Label	2.92 ^a	5.36 ^b	6.32 ^c
Regional	2.62 ^a	4.50 ^b	5.60 ^c
Organic	2.26 ^a	4.55 ^b	5.92 ^c

Note. ^{a-c} Different superscripts indicate significantly different means in each row following ANOVA post hoc Tukey tests at $p < .05$.

4.3.4. Differences in product perceptions between clusters

A significantly smaller percentage of respondents in the conscious cluster perceived regular vegetables, meat and fish products as healthy, compared to the pro-self cluster. This result indicates that those who attach most importance to sustainability attributes were the least convinced about the healthiness of products without sustainability attributes. The results for the two dairy products (milk and cheese) were slightly different but went in the same direction (see Table 4.4.). For most of the sustainable product alternatives, no significant differences in healthiness perceptions existed across the clusters, except for one of the dairy products. The organic cheese variant was more often perceived as healthy by the average cluster than by the pro-self cluster. In short, the results indicate that clusters mostly differed in healthiness perception of regular variants with the conscious consumers being less convinced about the healthiness of the regular products compared to pro-self consumers. This result applies to vegetables, meat and fish products but slightly differed for dairy.

Sustainability perceptions did not differ across the clusters, neither for regular variants, nor for sustainable variants. The only exception was regular broccoli. Pro-self consumers perceived regular broccoli more often as sustainable than respondents in the conscious cluster (see Table 4.4.).

Table 4.4. Percentage scored as “healthy” and as “sustainable” per cluster.

	Healthy			Sustainable		
	Pro-self	Average	Conscious	Pro-self	Average	Conscious
<i>Brucoli</i>						
Regular	69.3 ^a	63.3 ^{ab}	58.2 ^b	46.0 ^a	38.3 ^{ab}	33.3 ^b
Organic	65.3 ^a	71.2 ^a	71.3 ^a	59.3 ^a	65.5 ^a	69.1 ^a
<i>French beans</i>						
From Kenya	61.3 ^a	56.3 ^{ab}	48.5 ^b	30.0 ^a	28.3 ^a	26.1 ^a
From NL	62.7 ^a	69.8 ^a	63.4 ^a	47.3 ^a	56.6 ^a	54.9 ^a
<i>Pork steak</i>						
Regular	50.0 ^a	41.0 ^{ab}	37.1 ^b	30.7 ^a	28.6 ^a	34.4 ^a
Free range	46.0 ^a	48.2 ^a	44.9 ^a	48.0 ^a	53.1 ^a	50.8 ^a
<i>Chicken filet</i>						
Regular	62.7 ^a	52.3 ^{ab}	46.1 ^b	29.3 ^a	29.9 ^a	27.6 ^a
Organic	54.0 ^a	59.3 ^a	54.6 ^a	48.0 ^a	55.8 ^a	53.7 ^a
<i>Salmon</i>						
Regular	70.0 ^a	59.8 ^{ab}	54.4 ^b	30.0 ^a	28.6 ^a	27.6 ^a
MSC label	69.3 ^a	75.2 ^a	70.3 ^a	60.7 ^a	71.4 ^a	65.8 ^a
<i>Cheese</i>						
Regular	50.7 ^{ab}	55.0 ^b	43.2 ^a	40.0 ^a	37.8 ^a	31.4 ^a
Organic	48.0 ^a	62.5 ^b	57.2 ^{ab}	54.7 ^a	62.8 ^a	58.7 ^a
<i>Milk</i>						
Regular	56.7 ^a	54.2 ^a	45.1 ^b	31.3 ^a	30.5 ^a	30.9 ^a
Grassland label	58.0 ^a	67.7 ^a	62.2 ^a	56.7 ^a	64.4 ^a	61.8 ^a

Note. ^{a,b} Each superscript letter signifies a subset of clusters whose column proportions do not differ significantly at $p < .05$.

4.3.5. Differences in perceptions of regular versus sustainable products

To test for synergy in the perception of healthiness and sustainability McNemar tests have been conducted to check for each of the product pairs whether the sustainable alternative was significantly more (or less) often perceived as healthy compared to the regular product alternative. Synergy implies that a sustainability attribute not only leads to an increase in the perception of the product as sustainable, but also to an increase in the perception of the product as healthy. The analysis has been done for each of the clusters independently to see whether the results differed across clusters. Results show that within the pro-self cluster the differences in healthiness perception between the regular and sustainable variants were not significant for any of the included products. In contrast, both within the average cluster and within the conscious cluster, all differences were significant. These clusters perceived the sustainable product variants more often as healthy compared to the regular variants. The difference, indicating the perception of synergy between healthiness and sustainability, was the largest for conscious consumers. For them a sustainable attribute had the largest (positive) effect on their healthiness perception. In other words, for those who attach relatively more importance to sustainability, a sustainability attribute was most strongly associated with an increased healthiness perception of that product. The same analyses have been conducted to check for each of the product pairs whether the sustainable product variant was significantly more often perceived as sustainable compared to the regular product variant. For all products in all clusters the differences were significant, indicating that a sustainability attribute was associated with an increased perception of the product as being sustainable in all segments.

Looking at differences across the food categories, we observed that within the sustainability cluster the differences in healthiness perceptions between the regular and the sustainable variants were higher for vegetables, fish and dairy, compared to meat. This indicates that the addition of a sustainability attribute had less effect on the health perception of meat products than for the other food categories. In other words, for meat less synergy seemed to exist between healthiness and sustainability in the conscious cluster compared to the other food categories. For the average cluster, these food-category differences were less clear, although the mean difference for salmon indicates that the addition of an MSC label had the largest effect on the healthiness perception, in comparison to the other included products.

4.4. Discussion

To the best of our knowledge, this is one of the first studies exploring different attribute ratings across consumer segments and food categories, and studying synergy of healthiness and sustainability attributes. Implications thereof are discussed.

4.4.1. Segmentation on food-category attributes

The present research identified three consumer segments based on relative importance ratings of food-category attributes: pro-self consumers, average consumers and sustainable conscious consumers. This trichotomy of segments reflects the three sustainability-related segments identified by Verain et al. (2012). The identified consumer segments attach different relative importance to a range of food-category attributes, in line with other recent studies (e.g. Onwezen et al., 2012), and shows the importance of attribute segmentation at the food-category level.

For each of the food categories the included attributes load on two factors: one pro-self factor capturing taste, price and healthiness, and one sustainability factor capturing all included sustainability attributes. Although the four food categories show the same pattern, further exploration of other categories such as bread or sweets is needed to study the internal validity of our results for other categories. The finding of one sustainability factor is in accordance with existing literature (Bellows et al., 2010; Bond et al., 2008; Lindeman & Väänänen, 2000). Van Dam and van Trijp (2011), show that people can cognitively distinguish between sustainability dimensions, but in terms of motivation all sustainability attributes lump together into one dimension. The finding that healthiness loads on one factor together with price and taste is surprising, as these were identified as separate factors in other studies, although these factors showed a positive correlation (e.g. Bond et al., 2008; Sautron et al., 2015). In the profiling results on general food choice motives, though, we found that the respondents scoring food products higher on sustainability also score them highest on healthiness. A possible explanation would be that at the general food level, the distinction between immediate and long-term benefits is more salient, whereas at the food-category level the distinction between pro-self and pro-social (sustainability) attributes is more salient. The contrasting findings for general food motives and food-category attributes underpins the importance of including food-category-specific measurements. Until now, most studies have included attributes, benefits or motives at the general level, and do not discriminate between food categories or study one food category in isolation. The current study not only reveals that differences exist between product categories, but also

that importance ratings differ across the different levels of abstraction shown in Figure 4.1. This might be an interesting approach when communicating about healthiness and sustainability with regard to food choice in general or more specific food categories and needs further research.

4.4.2. Healthiness and sustainability perceptions

Perceptions of synergy between healthiness and sustainability appear to differ across the three identified segments. This study shows that pro-self consumers perceive no difference in healthiness between regular and sustainable product variants. In contrast, the average consumers and particularly the conscious consumers perceive sustainable variants as being more healthy compared to regular variants. These findings indicate that the largest synergy between healthiness and sustainability attributes is perceived by conscious consumers.

A possible explanation for the synergy perception by conscious consumers could be that the importance of sustainability is related to the health qualities that consumers infer from sustainability attributes. This explanation relates to the literature on halo effects. A halo effect occurs when a consumer evaluates a product favorably on a certain quality aspect because of an initially favorable impression of that product on an unrelated dimension (Schuldt, Muller, & Schwarz, 2012; Schuldt & Schwarz, 2010). Sustainability attributes of a product could, for example, lead to a positive perception of the healthiness of the product even though the sustainability aspect has objectively no effect on the healthiness of that product (Parras-Rosa, Vega-Zamora, Murgado-Armenteros, & Torres-Ruiz, 2013).

The product perceptions underline the differences between consumer segments in food category attribute importance ratings. The segment attaching the most importance to sustainability attributes perceives the highest synergy between healthiness and sustainability. The positive relation between importance ratings and perceptions of a certain attribute is in accordance with earlier research. A study by Onwezen et al. (2012) and Sijtsema, Jesionkowska, Symoneaux, Konopacka and Snoek (2012) found that segments that attach relatively more importance to healthiness perceive products as more healthy.



4.4.3. Implications and suggestions for future research

Consumer segments differ in the relative importance and perceptions associated with healthiness and sustainability as compared to price and taste. Therefore the current study implies that marketing and policy communications on healthy and sustainable food consumption should best be tailored to specific consumer segments. The synergy findings show the potential of using pro-self motives, such as healthiness, to stimulate sustainable choices (Chryssohoidis & Krystallis, 2005; Kareklas et al., 2014; Magnusson et al., 2003). Especially for respondents in the average cluster, the fact that they perceive products with sustainable attributes as more healthy could be a good communication strategy, as they attach more importance to health than to sustainability. Also, in approaching conscious consumers, the synergy between healthiness and sustainability could be beneficial. A sustainable attribute seems important to convince this cluster about the healthiness of a product. This implies that for this cluster sustainability attributes should be emphasized in communication, as it increases healthiness perceptions. In addition, making their health motives more salient may lead to more sustainable product choices, because of their inference of healthiness. The pro-self segment does not perceive synergy between healthiness and sustainability. Therefore, for this cluster other attributes should be studied in order to find out which attributes should be targeted to stimulate healthy and sustainable consumption.

The current study was based on a representative sample of the Dutch population and we therefore feel confident to generalize our findings for the Netherlands. Whether similar segments can be identified in other countries is left for future research. The results, however, overlap to a large extent with the three consumer segments that have been identified in a literature review on sustainable consumer segments including studies from a wide range of countries (Verain et al., 2012) which makes it likely to expect similar results in other countries. In addition, Markovina et al. (2015) compared the variation in factor structure of the Food Choice Questionnaire (FCQ) and the perceived importance of food choice motives across 9 European countries and found the same nine-factor structure in all countries. The paper concludes that countries highly agree on the relative importance of food choice factors. Because the segmentation basis used in the current paper is based on the FCQ, the findings by Markovina et al. (2015) render it likely to expect similar findings in other European countries.

The combination of healthiness and sustainability may be used to target specific consumer segments in exploratory field studies. As mentioned in the introduction, we expected healthiness and sustainability attributes to be strongly positively related (consumers who value sustainability attribute also value healthiness and the other way

around; see also Sautron et al., 2015). The results show that for conscious consumers, healthiness and sustainability both score high, as expected. Among the other segments however, healthiness is valued much more than sustainability. This shows that importance of healthiness and sustainability not always go hand in hand, which implies that marketing communication should be adapted to the motives of the target group.

The way in which the current findings can best be applied in food interventions is an avenue for future research. The results are based on self-reported measures on the importance of a range of attributes. Although it is generally accepted that motives or attribute importance are closely related to behavioral intentions or even to actual behavior (Ajzen, 1991; Brunsø et al., 2004; Eertmans, Victoir, Vansant, & van den Bergh, 2005; Glanz, Basil, Maibach, Goldberg, & Snyder, 1998), contextual factors fall outside the scope of this paper. Context-specific studies such as field experiments are needed to increase the external validity of the results for specific contexts. In addition, external validity can be enhanced by including objective (instead of self-reported) real-world data such as scanner data (Lusk, 2011; Sousa, 2012).

From this study we learn that, depending on research goals, food-category differences should be taken into account. The factor analyses show that the best solution is obtained when attribute ratings are analyzed separately for the included food categories. The existence of synergy seems to differ across food categories. The results suggest that synergy perceptions are the weakest for meat products, and therefore less gains could be expected from synergies for meat. Thus if interventions are developed for changes towards more plant-based diets, the communication about health and sustainability of meat should differ from the communication about vegetables (it is more beneficial for vegetables than for meat to emphasize the health gain in addition to sustainability gains). This implies that in research in which food categories play a central role (e.g. in stimulating changes in dietary patterns), attribute importance should be measured at the food category level. Future research is necessary to get more insights at this point.

In addition, we learn that sustainability attributes can be promoted as a container construct, as all sustainability items load on one underlying factor. Future research should be conducted to identify additional attributes (e.g. convenience) that may provide more insight into food-category attribute ratings. Also, more detailed health-related (e.g. caloric content, fat, vitamins), and sensory attributes (e.g. texture, smell, sensory appeal) should be included in future research, as the lack of these attributes might be the reason for price, taste and healthiness to load on the pro-self factor instead of separate sensory and healthiness factors (Bond et al., 2008).

A final interesting research question for future research concerns the transition of consumers from one segment to another. The clusters of pro-self consumers, average and conscious consumers suggest that consumers may move in only one direction: from pro-self consumers to average, and from average to conscious. The reverse direction seems to be highly unlikely because consciousness of sustainability is unlikely to disappear (see for example the stages of change model, Prochaska & Velicer, 1997). Future research may be aimed at finding out how pro-self consumers can be made conscious of sustainability, since apparently, healthiness does not seem to trigger it.

4.5. Conclusions

The current consumer study is one of the first showing the relevance of measuring product attributes at the category level. It shows that importance ratings of food-category attributes form a useful segmentation basis. Three consumer segments with distinct importance profiles of food attributes have been identified. Moreover, the identified segments differ in their general food choice motives and in their perception of synergy between healthiness and sustainability of food products. Insight into the importance consumers attach to healthiness and sustainability and in their related product perceptions can be helpful in developing effective policies and campaigns and successful marketing strategies in order to stimulate healthier and more sustainable food choices. Such efforts need to be tested in field experiments first, in order to account for situational effects on consumer behavior.

Acknowledgements

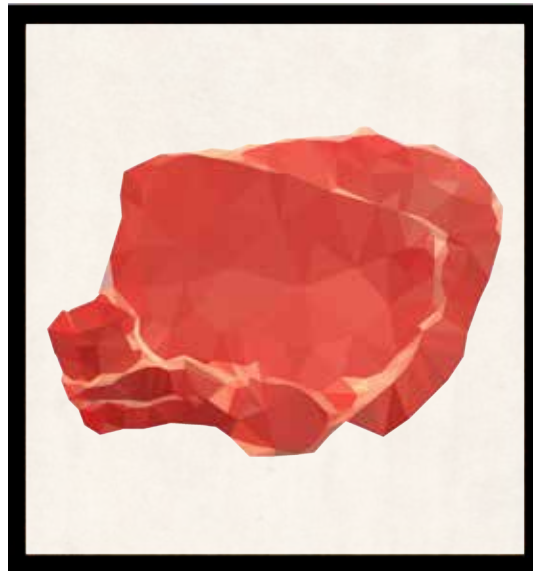
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Chapter 5

Flexitarianism: A range of sustainable food styles

People who don't abstain from meat as a matter of principle may still eat less of it.
(Steven Pinker, *The Better Angels of our Nature*, 2011, p.472)



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Abstract

The consumption of meat accounts for a large proportion of the ecological footprint of contemporary western diets. Therefore, a reduction in meat consumption, i.e. flexitarianism, would make a substantial contribution to a more sustainable food system. Flexitarianism displays itself in various ways of meat consumption moderation and appears to be acceptable for a large number of Dutch food consumers. What factors motivate flexitarianism, and what varieties of flexitarian food styles can be distinguished? An empirical survey has been conducted among 1312 Dutch consumers to identify clusters with different consumption styles with respect to meat. Differences across the clusters were found with respect to meat consumption, preferred societal actions to reduce meat consumption, and food neophobia. It is concluded that flexitarianism as a sustainable food style can take several forms. Several meat consumption reduction strategies to approach the different types of flexitarians are discussed.

5.1. Introduction

A shift in western meat consumption patterns could significantly reduce the ecological effects of the food system. The consumption of meat accounts for a large proportion of the ecological footprint of consumers. Therefore, reduction of meat consumption is important in making more sustainable food choices. Although the average consumer may not consider meat consumption as a highly relevant sustainability issue, in scholarly thinking the ecological effects and energy-intensiveness of meat consumption and production have been acknowledged for over more than 20 years. As a result of the world-wide rising levels of meat consumption and production, experts increasingly express urgent reasons to adjust meat consumption to more sustainable levels. Although discussions on more sustainable food consumption patterns are mainly focused on meat reduction, from a sustainability perspective a transition is needed towards a diet that is less dependent on all types of animal proteins, including dairy, eggs and fish (see Reisch, Elbrie, & Lorek, 2013; Tukker et al., 2011; Westhoek et al., 2011). A switch towards less animal-based and more plant-based diets would not only benefit the sustainability of our diets, but would also positively affect consumer health (see Van Dooren, Marinussen, Blonbk, Aiking, & Vellinga, 2014).

Sustainability in the food system is a matter of both production and consumption (McMeekin & Southerton, 2012), hence it is doubtful that technological innovations to reduce unsustainable aspects of animal production and livestock systems will be sufficient to overcome environmental problems. Therefore, we stress the importance of taking consumers as possible change agents into account. Consumers have the ability and inclination to adopt more environmentally-friendly food styles by making more sustainable food choices, and developing more sustainable food consumption patterns. But it would be naive to think that adopting a more sustainable food style would be easily realized even for those consumers who are highly motivated. In addition to consumers' willingness to change their diets, structural constraints that influence the change possibilities are important to study. Such constraints include the material conditions of choice (availability, affordability, etc.) as well as opportunities and obstacles in the form of intangible "codes of conduct" (cultural values, social norms, institutional support, advertising, etc.) (see Dolan, 2002; Vinnari & Vinnari, 2013). It is important to keep this contextualization of consumption in mind with respect to sustainable consumption in general (see also Jackson, 2005) as well as, more specifically, with respect to meat production and consumption, given their central position to the food system and the central place of meat on our plates.

Our objective in this research is to improve understanding of meat consumption reducers (flexitarians) by identifying and describing clusters of (food) consumers who differ in the type of flexitarianism. Empirical results will be presented about consumer opinions concerning meat consumption and meat reduction. This study focuses on symbolic-ethical variables beyond an “economic” view implying rational choice, utility value and functionality of consumer goods. We believe that food consumption cannot be understood completely by rational behavioral determinants. Particularly with respect to sustainable food consumption, moral beliefs or ethical concerns cannot be omitted. Strikingly enough, suggestions to modify the well-known Theory of Planned Behavior and the Food Choice Questionnaire have focused on the incorporation of so-called consumer concerns (e.g. animal welfare, fair trade, environmental protection) in order to improve our understanding of (sustainable) food consumption (see Dowd & Burke, 2013; Fotopoulos, Krystallis, Vassalo, & Pagiaslis, 2009; Lindeman & Väänänen, 2000; Raats, Shephard, & Sparks, 1995).

Although consumer concerns could be seen as altruistic, other-oriented or pro-social, at the other end of the spectrum more hedonistic and egoistic or pro-self considerations could also motivate sustainable consumption. Self-interest motives should not be excluded from discussions about sustainable behavior and behavioral change. The idea of “green to be seen” offers (controversial) avenues for consumers to move in more sustainable directions (Griskevicius, Tyler, & van den Bergh, 2010). We can only pay limited attention to these discussions about “conspicuous sustainable consumption” by including status in our analytic framework as a perceived symbolic value of meat.

In Section 5.2., we present definitions and describe several types of flexitarianism, summarize various motives behind flexitarianism, and describe several pathways aimed at achieving a flexitarian food style. Section 5.3. presents our empirical study, and the results are discussed in Section 5.4.

5.2. Flexitarianism as a sustainable food style

5.2.1. Flexitarianism and food styles

After the emergence of the word flexitarianism in the beginning of this century, the term evolved from a definition of a vegetarian consumption pattern, occasionally including meat products, to a broader interpretation of reduced meat consumption, without avoiding meat altogether. Seen from this perspective, flexitarianism is a new term that can be found in the literature under different synonyms. For example, Fox

and Ward (2008) talk about partial vegetarians. Janda and Trocchia (2001) study pseudo-vegetarians, defined as people who abstain from meat-based products, but occasionally eat some meat. Beardsworth and Keil (1991, 1992) identified type I vegetarians, who consider themselves vegetarian, but occasionally consume red meat or poultry, for example when vegetarian food options are unavailable or in cases where they want to avoid embarrassment in social settings where meat is being served. Rothgerber (2014) studies consumers who identify themselves as vegetarians but who report to eat animal flesh occasionally, to varying degrees, and labels these consumers “semi-vegetarians.” Baker, Thompson and Palmer-Barnes (2002) study meat reducers, reporting that they consciously endeavor to reduce the amount of meat they eat. And finally, Povey, Wellens and Conner (2001) distinguish a group of meat avoiders who abstain from eating meat but who do eat fish.

The above-mentioned varieties of meat reducers show that the differences between flexitarian and vegetarian categories are gradual. However, it is clear that to many contemporary consumers the total elimination of meat from the diet (vegetarianism) is less acceptable than meat reduction (flexitarianism), implying either the substitution of meat with other protein-rich types of food or no substitution at all. Every food consumer who abstains from eating meat at least one day a week, may be called a flexitarian, regardless of the reason for abstention.

5.2.2. Motives for meat eating, meat reduction and meat avoidance

Flexitarianism is not necessarily a stepping stone towards vegetarianism (Baker et al., 2002) and can be regarded as a “food style,” a certain style or culture of eating, including a broad range of attitudes and activities related to food (see Askegaard & Madsen, 1998; Korthals, 2012). Food styles are not mutually exclusive and overlap to some degree. Two consumers who consume the same kind of foods may have completely different motivations. For example, a vegetarian food style may be motivated by health benefits, by environmental concerns and/or by concerns for animal welfare. In order to gain a better understanding of flexitarian behavior, it is important to obtain insights in underlying motives for meat curtailment. As research on flexitarianism is very limited, it can be helpful to place flexitarianism in a spectrum with vegetarianism at one end and a meat-centered diet at the other and investigate both poles. The main motives for vegetarianism are moral and ethical beliefs and concerns about animal welfare and killing of animals, followed by health reasons. Other motives are environmental concern, disgust with eating meat, religion and aspirations to belong to a reference group (Fox & Ward, 2008; Hoek, Luning, Stafleu, & de Graaf, 2004; Janda & Trocchia,

2001; Lea & Worsley, 2001; Povey et al., 2001; Rozin, Markwith, & Stoess., 1997; Ruby, 2012). The main motives for eating meat are perceived healthiness, taste appreciation and eating enjoyment, as well as the unwillingness to change eating habits, value for money or the appeal of such product characteristics as leanness, easy to prepare or safe to eat (see Lea & Worsley, 2003; Povey et al., 2001; Verbeke & Viaene, 1999). In addition, meat is perceived as a symbol of power, status and masculinity (Rothgerber, 2012; Rozin, Hormes, Faith, & Wansink, 2012; Ruby & Heine, 2011).

With respect to environmental concern, flexitarians are much more similar to meat eaters than to vegetarians (Janda & Trocchia, 2001). Rothgerber (2014) has found that semi-vegetarians, who eat meat occasionally, express more liking for meat, are less disgusted by meat and have less emotional resistance to meat consumption compared to vegetarians, but they experience more feelings of guilt compared to meat eaters. Motivations for this flexitarian behavior are evenly divided between health, ethics and a combination of both these aspects.

5.2.3. Meat reduction studies

Given the growing awareness and concern in the past few decades about meat products as energy-intensive and ecologically burdensome foods, it is notable that only few scholars have addressed the moderation of meat consumption as a topic of research. Notable early exceptions are Richardson et al. (1994a, 1994b), and Baker et al. (2002) in the UK, and, more recently, a few North-European studies (Latvala et al., 2012; Nordgren, 2012; Vinnari, Mustonen, & Räsänen, 2010). Also in the Netherlands flexitarians have been newly studied (Dagevos, 2014; Dagevos & Voordouw, 2013; De Bakker & Dagevos, 2012; Schösler, de Boer & Boersma, 2012).

Three studies on meat reduction are worth mentioning, as they relate to our empirical work. Latvala et al. (2012) investigated meat consumption patterns in Finland. Six consumer segments, categorized in three cluster blocks, were identified: the first cluster block (48%) has no intention to change their established meat consumption pattern; the second cluster block (13%) has made a shift toward less meat and more vegetable consumption in the past year; the third cluster block (39%) consists of consumers who are in the middle of change towards a reduction in the use of meat and an increase in the use of vegetables. The most important overall reason for change was healthiness. Environmental concern and animal welfare are important reasons for change in some clusters particularly in the cluster with the intention to decrease their meat consumption in all meat categories and increase their vegetable consumption.

Hoek et al. (2004) categorized their respondents as vegetarians, consumers of

meat substitutes (non-vegetarians) or meat consumers. They found that the group of meat substitute consumers had a socio-demographic profile comparable to vegetarians, but their food-related lifestyle and health attitudes mainly were in between those of vegetarians and meat eaters.

Vanhonacker, van Loo, Gellynck and Verbeke (2013) identified five distinct consumer clusters or segments which can be differentiated on the basis of their meat consumption frequency. The so-called conscious and unwilling segments (41% of the sample) have the highest meat consumption frequency and the active segment (19% of the sample) reports the lowest meat consumption frequency and the highest incidence of consuming less meat per meal. This Flemish sample confirms that meat eating prevails and meat reduction is still in its infancy.

5.2.4. Pathways towards a flexitarian food style

In the literature, several behavioral strategies towards more sustainable food consumption are discussed. Insights in these distinct pathways can be helpful in identifying, understanding and stimulating several types of flexitarianism. The two main pathways that are often distinguished are minor adjustments to habitual consumption patterns (weak sustainable consumption) and undertaking radical transformations (strong sustainable consumption). Flexitarians following the first pathway choose products that are less burdening for the environment (e.g. hybrid meat products), whereas the latter make fundamental changes in consumption patterns, (e.g. substantial reduction of consumption levels of meat) (Fuchs & Lorek, 2005; Lorek & Fuchs, 2013; Scholl, Rubik, Kalimo, Biedenkopf, & Söebeck, 2010; see also De Bakker & Dagevos, 2012). These two pathways differ in both quality consuming differently and efficiently, and quantity consuming less. Alternatively, the distinction may be reformulated by contrasting an (eco-)efficiency approach and a sufficiency approach (Boulanger, 2010) in which the first puts emphasis on meat reduction strategies through consumers opting for sustainably produced meat products or low-meat *products*, while the second stresses *behavioral* dietary change by consumers. Alternatively, the first approach may be called product-related, the second act-related consumption (Verain et al., 2012).

Two studies identified pathways to reduce meat consumption more specifically. Schösler et al. (2012) identify four pathways towards meat substitution. The first and most difficult path entails challenging existing meal formats and food hierarchies. It is about food choices that deviate from the cultural norm and require breaking with conventional diets, such as the use of tofu or lentils instead of meat. Eating in a “different,” more sustainable way can become important to one’s identity. The second

pathway entails an incremental change towards more health-conscious vegetarian meals by replacing meat with other “regular” products such as fish, eggs and cheese. As these meat alternatives are still animal-based, this route is not very promising in terms of sustainability, but can be a first step in a shift towards a more plant-based diet. The third pathway contains meat substitution in convenience food. Meat is already less visible in most convenience products compared to traditional meals and therefore can be substituted easily. The last pathway entails reducing meat portion size. This pathway should be seen as an addition to substitution-oriented pathways.

De Bakker and Dagevos (2012) identify three broader routes to moderating meat consumption. The first one is labelled “sustainability by stealth” and entails the acceptance of rather unnoticeable sustainable food innovations. An example is the incorporation of plant products in meat products to form more sustainable hybrid products. This rather technological route is particularly suitable for uninvolved or passive consumers. This route is most similar to the third pathway discussed by Schösler et al. (2012), the convenience-oriented path. The second route involves social debate and small practical steps towards more sustainable food consumption such as meat reduction through moderating meat portion size and/or incorporation of meatless days. This route requires at least moderately involved consumers and is similar to the fourth pathway identified by Schösler et al. (2012). The third route, involving cultural change, is an extension of the second route. This route includes lifestyle alternatives that are structurally different from current consumption practices. Cultural values need to be changed. This route requires high food involvement and ethical motives and is related most to the first pathway, identified by Schösler et al. (2012).

Next, the results of an empirical survey will be presented. Section 5.3. provides detailed analysis of meat consumption clusters based on their motives and opinions about meat consumption.

5.3. Empirical survey

5.3.1. Method

The survey was conducted in October 2011 in a sample of 1312 individuals, randomly drawn from a panel of a Dutch marketing research agency (see also Dagevos, 2014; & Voordouw, 2013). The panel is representative for the Netherlands with respect to gender, age, and education level. Since vegetarians and vegans do not consume meat at all, and therefore do not fall within the definition of flexitarians, they were removed from the data set, resulting in 1253 individuals eligible for analysis. Fifty per cent of the

sample were male, about 50% were older than 45 years of age, 33% had obtained higher education, 23% lived in a one-person household, 39% lived in a two-person household, and 38% lived in households with three or more persons.

The participants completed an online questionnaire including questions concerning current meat consumption (number of days per week), meat consumption increase in the past year and intended meat consumption increase in the next year (both measured on 7-point scale running from 1 “much less meat” to 7 “much more meat” and 4 indicating no change). Further questions related to norms, perceptions and opinions concerning meat consumption and meat substitution. All answers were given on 7-point Likert scales (1=“Totally disagree” to 7=“Totally agree”).

Personal norms. Personal norms concerning meat consumption reduction (Cronbach’s Alpha=.86), were operationalized through two items: “Because of my own values and norms, I feel morally obliged to eat less meat,” and “It is important that people in general eat less meat.”

Perceived positive health effects. Perceived positive health effects of reduced meat consumption (Cronbach’s Alpha=.89), were operationalized through four items: “Eating meat is unhealthy,” “Meat causes heart diseases,” “Meat causes cancer,” and “Meat fattens.”

Perceived status. Perceived status of meat consumption (Cronbach’s Alpha=.70), was operationalized through four items: “Eating meat is ‘cool’,” “By eating meat, I feel I am on top of the food chain,” “Eating meat gives one status,” “By eating less meat I feel myself as being unworthy.”

Appreciation of meatless meals. Appreciation of meatless meals (Cronbach’s Alpha=.70), was operationalized through three items: “The day after a barbeque with meat, I eat less meat,” “I like a meal without meat,” and “It is easy to prepare a tasty meal without meat.”

Need for meat. Need for meat consumption (Cronbach’s Alpha=.72), was operationalized through two items: “After a day without meat I feel extra need for meat,” and “If I do not eat meat for a whole day, I feel weaker.”

Importance of environment/animal friendliness. Importance of environment/animal friendliness (Cronbach’s Alpha=.82), was operationalized through three items: “If I buy meat I want to know it has been produced in an animal-friendly way,” “If I buy meat I want to know it has been produced in an environmentally-friendly way,” and “Animal well-being is important to me.”

Dislike of animals as a source of meat. Dislike of animals as a source of meat (Cronbach's Alpha=.60), was operationalized through two items: "The idea that meat comes from animals gives me an unhappy feeling," and "I can accept that meat comes from animals" (reverse scored).

Price. Two single items dealt with spending money on meat: "Meat is not expensive," and "Meat is worth its money."

To reduce the influence of answering tendencies, the scales were centered before the cluster analysis, by subtracting the average scale score of each respondent from that individual's raw scale scores. In addition to the above-stated questions, several questions concerning the strategy on how to reduce meat and food neophobia were asked. Finally, several questions concerning responsibility for societal action on meat reduction (e.g. own responsibility, government, supermarkets, societal organizations), and the type of actions that should be taken (e.g. taxes, campaigns, increase availability of meat alternatives), were included.

5.3.2. Results

In order to cluster the sample based on norms, perceptions and opinions concerning meat consumption, cluster analysis was conducted based on the constructs mentioned above, except for information about meat consumption, the type of meat substitution, the opinions about who should take responsibility in bringing about changes in meat consumption and food neophobia, which were used to profile the clusters. This approach was chosen because consumption is assumed to result from associations with meat. If the clusters are to be used in sustainable policy making aimed at reducing meat consumption, the variables to be influenced should be norms, perceptions and opinions. The clusters were then profiled on current meat consumption, intention to reduce meat consumption and socio-demographic variables.

Hierarchical agglomerative cluster analysis was conducted using Ward's method, minimizing the squared deviations from the cluster means of all input variables. Inspection of the dendrogram a figure indicating the relative distance of the clusters and judging the feasibility of the cluster solution for interpretation led to five clusters. With more than five clusters, the clusters became much less distinctive; with less than five clusters, important information distinguishing the clusters seemed to be lost. The resulting clusters were profiled with univariate ANOVAs (with post hoc Tukey comparisons of mean scores) and cross tabulations (with Pearson χ^2) to test for significant differences between the identified segments on the segmentation and profiling variables.

Table 5.1. Cluster variable means, reported meat consumption, gender and age by cluster.

Segmentation variables (scales)	Clusters					Total
	1	2	3	4	5	
Personal norm to consume less meat	2.01 ^a	3.44 ^b	5.19 ^c	1.61 ^d	3.52 ^b	3.30
Perceived positive health effects of less meat	2.25 ^a	3.17 ^b	3.78 ^c	2.02 ^a	2.61 ^d	2.92
Status of meat consumption	2.00 ^a	2.87 ^b	1.65 ^c	2.94 ^b	1.66 ^c	2.33
Appreciation of meatless meal	3.33 ^a	3.88 ^b	5.59 ^c	2.27 ^d	5.49 ^c	4.10
Need for meat consumption	2.45 ^a	3.36 ^b	1.58 ^c	4.98 ^d	1.38 ^c	2.77
Importance of environment/animal friendliness	4.21 ^a	4.08 ^{a,b}	5.36 ^c	3.79 ^b	4.42 ^a	4.36
Dislike of animals as source of meat	1.92 ^a	3.07 ^b	3.36 ^b	1.55 ^c	1.74 ^{a,c}	2.60
Meat is not expensive	3.94 ^a	3.33 ^b	2.57 ^c	3.82 ^a	4.52 ^d	3.48
Meat is worth its money	5.63 ^a	4.13 ^b	3.78 ^c	5.94 ^a	5.18 ^d	4.67
Reported meat consumption and intentions						
Days of meat consumption per week	5.17 ^a	4.58 ^b	3.54 ^c	5.87 ^d	4.35 ^b	4.61
Increase of meat consumption last year	3.92 ^a	3.57 ^b	2.92 ^c	4.09 ^a	3.39 ^b	3.55
Intention of meat consumption increase next year	3.94 ^a	3.64 ^b	3.00 ^c	4.17 ^a	3.50 ^b	3.62
Socio-demographic variables						
Male (%)	57.2 ^{a,b}	52.5 ^b	31.7 ^c	68.9 ^a	38.0 ^c	49.6
Age 18–29 years (%)	14.7 ^a	25.5 ^b	15.9 ^a	18.9 ^{a,b}	19.0 ^{a,b}	20.0
Age 30–45 years (%)	28.8 ^a	33.1 ^a	28.9 ^a	32.0 ^a	27.3 ^a	30.6
Age 46–65 years (%)	46.4 ^a	31.5 ^b	44.3 ^a	41.8 ^{a,b}	42.1 ^{a,b}	39.3
Age 65+ years (%)	10.1 ^a	9.9 ^a	11.0 ^a	7.4 ^a	11.6 ^a	10.1
Cluster size (%)	22.2	38.8	19.6	9.7	9.7	100

Note. ^{a-d} In each row, different superscripts indicate significantly different cluster means or column proportions, respectively ($p < .05$).



Although the cluster analysis was based on the centered scale values, Table 5.1 reports the unscented average values of the scales to facilitate the interpretation of the results. We observe that meat consumption is the lowest in cluster 3 which scores the most favorable on norms, perceptions and opinions regarding meat reduction and has the highest percentage of females. Cluster 4 scores the highest on meat consumption, followed by cluster 1 but these clusters differ in personal norms, status, appreciation of meatless meals, need for meat consumption, importance attached to the environment and animal friendliness and dislike of animals as source of meat. Clusters 2 and 5 score in between on meat consumption but differ on status, appreciation of meatless meals, the need for meat, dislike of animals as a source of meat, and on the money values, as indicated by superscripts in Table 5.1. Gender and age differed significantly across the clusters. Education level, income and family size were not significantly different and are not reported in Table 5.1. Next, the clusters will be described in more detail.

Cluster 1. Meat lovers (22.2%)

This cluster considers meat as relatively inexpensive and worth the money. The “light” flexitarians in this cluster do not appreciate meatless meals much and do not dislike animals as a source of meat. They have relatively high current meat consumption (about 5 days a week), which has remained the same in the past and will remain the same in the future. The percentage of males is relatively high, the 46–65 years age class is relatively large and the youngest age group is relatively small. On the other variables, this cluster does not differ very much from the other clusters. However, cluster 1 differs from cluster 4 the other high meat consumption cluster in that they appreciate meatless meals a bit more, and do not express a high need for meat consumption.

Cluster 2. Unconscious flexitarians (38.8%)

This cluster scores relatively high on dislike of animals as a source of meat, and together with cluster 4 scores the highest on status derived from meat consumption. Its level of meat consumption is average. The 46–65 years age group is slightly under represented in this cluster of “medium” flexitarians. They differ from cluster 5 the other cluster of “medium” flexitarians in that they derive more status from meat consumption; appreciate meatless meals less; need meat less; dislike animals as a source of meat more; find meat more expensive, and less worth its money. Cluster 2 is the largest cluster, and it seems they are willing to consider alternatives for meat, most likely the cheaper ones.

Cluster 3. Conscious Flexitarians (19.6%)

This cluster's answers to the questionnaire indicate relatively positive attitudes towards reduced meat consumption. It has the lowest frequency of weekly meat consumption, on average 3.5 days per week. Many food consumers in this cluster of "heavy" flexitarians have reduced meat consumption in the past and will reduce it further in the future. Sixty-eight per cent are women; the youngest age group is under represented, whereas the 46–65 years age group is slightly over represented.

Cluster 4. Compulsive meat consumers (9.7%)

This cluster's answers to the questionnaire indicate negative attitudes towards reduced meat consumption. In contrast with cluster 1, the other "light" cluster, they do not appreciate meatless meals, and express a higher need for meat. Sixty-nine per cent are males. This cluster has the highest meat consumption on average, about 6 times per week, which is stable over time. This cluster reports a high need for meat and does not seem to be willing to consider meat alternatives at all. In other words, the level of flexitarianism in this cluster is very "light" and more a matter of coincidence than commitment.

Cluster 5. Potential flexitarians (9.7%)

This cluster hardly derives status from meat consumption, seems to appreciate meatless meals and has a low need for meat. It has an average level of meat consumption. These factors differ positively with respect to reduced meat consumption from those in cluster 2—the other cluster of "medium" flexitarians. However, they less often dislike animals as a source of meat, find meat less expensive and more worth its money than cluster 2. Sixty-two per cent are female. This cluster might consider meat alternatives, especially because of environmental and animal welfare reasons.



Table 5.2. Meat alternatives and meat reduction behavior.

Meat alternatives (%)	Clusters					Total
	1	2	3	4	5	
Fish	68.3 ^a	64.9 ^a	70.1 ^a	72.1 ^a	73.0 ^a	68.2
Egg	44.1 ^a	53.0 ^{a,b}	57.7 ^b	50.0 ^{a,b}	58.6 ^{a,b}	52.7
Cheese	29.2 ^a	27.0 ^a	35.5 ^a	19.1 ^a	34.2 ^a	29.7
No alternative	23.3 ^{a,b}	19.9 ^b	31.2 ^a	20.6 ^{a,b}	31.5 ^{a,b}	24.5
Mushroom	14.9 ^{a,b}	15.4 ^b	31.6 ^c	10.3 ^{a,b}	27.0 ^{a,c}	20.0
Pulses	11.4 ^a	15.7 ^a	26.9 ^b	13.2 ^{a,b}	21.6 ^{a,b}	17.9
Vegetarian burger	7.9 ^{a,b}	15.7 ^b	29.5 ^c	2.9 ^a	16.2 ^{a,b,c}	16.5
Nuts	5.4 ^a	6.3 ^a	15.4 ^b	4.4 ^{a,b}	8.1 ^{a,b}	8.3
Tofu	3.0 ^a	7.3 ^{a,b}	14.1 ^b	4.4 ^{a,b}	7.2 ^{a,b}	7.8
Other	4.0 ^a	4.8 ^a	3.8 ^a	11.8 ^a	4.5 ^a	4.8
Evaluation of meat alternative						
Fish	5.78 ^{a,b}	5.28 ^a	6.02 ^b	5.33 ^a	6.13 ^b	5.62
Egg	4.38 ^a	4.38 ^a	5.28 ^b	4.06 ^a	5.31 ^b	4.61
Cheese	3.88 ^a	3.84 ^{a,b}	4.70 ^c	3.35 ^b	4.50 ^c	4.04
Pulses	3.14 ^a	3.48 ^a	4.63 ^b	2.55 ^c	4.40 ^b	3.63
Mushrooms	3.16 ^{a,b}	3.36 ^a	4.64 ^c	2.70 ^b	4.41 ^c	3.60
Vega burger	2.66 ^a	3.30 ^b	4.52 ^c	1.99 ^d	3.79 ^b	3.32
Nuts	2.70 ^{a,b}	3.01 ^a	4.17 ^c	2.36 ^b	3.66 ^d	3.17
Tofu	2.27 ^a	2.89 ^b	4.05 ^c	1.83 ^a	3.55 ^c	2.94
How to reduce meat? (%)						
Use meat substitute	23.0 ^a	30.7 ^a	63.0 ^b	8.2 ^c	50.4 ^b	35.0
Leave meat out of meal	16.9 ^a	21.6 ^a	45.5 ^b	5.7 ^c	33.9 ^b	24.9
Eat smaller portions	11.2 ^a	26.5 ^b	32.5 ^b	5.7 ^a	31.4 ^b	22.7
Don't eat particular type of meat	7.9 ^{a,b}	15.6 ^c	28.5 ^d	4.9 ^b	16.5 ^{a,c,d}	15.5
Other	1.1 ^{a,b}	1.0 ^b	4.5 ^a	3.3 ^{a,b}	0.8 ^{a,b}	1.9

Note. ^{a-c} In each row, different superscripts indicate significantly different cluster means or column proportions, respectively ($p < .05$).

With regard to the consumption of meat alternatives, it appears that fish, eggs, cheese, no alternative, mushrooms, pulses, vegetarian burgers, nuts, and tofu are used as meat substitutes in decreasing order (see Table 5.2.). This order is more or less similar across the clusters, and calls to mind the hierarchy of foods (Twigg, 1983; see also Dagevos & Voordouw, 2013). It is notable that meat reduction without substitution for an alternative is even more likely than substitution by mushrooms, pulses, vegetarian burger, nuts and tofu.

Regarding preferences for meat alternatives, differences across the clusters exist, except for fish, which is the most preferred alternative to meat in all clusters. Eggs and cheese are preferred almost equally by the potential flexitarians (cluster 5) and the conscious flexitarians (cluster 3). Eggs seem to be somehow acceptable in the other clusters, even to the compulsive meat consumers (cluster 4). Cheese, mushrooms and pulses seem to be acceptable alternatives in both the conscious flexitarian (cluster 3) and the potential flexitarian cluster (cluster 5).

With regard to the way of reducing meat, there is a striking difference between conscious flexitarians in cluster 3 and potential flexitarians in cluster 5, and the other clusters. Conscious flexitarians and potential flexitarians indicate much more often that they use meat substitutes and that they leave meat out of the meal entirely. These clusters are also most open to consuming smaller meat portions, although this way to reduce meat consumption is also used by unconscious flexitarians. Interestingly, among conscious flexitarians leaving meat out of the meal entirely is used more than lowering portion size, whereas for potential flexitarians and unconscious flexitarians, the difference in these two ways to reduce meat consumption is much smaller and even reversed among unconscious flexitarians. In addition, conscious flexitarians distinguish themselves by being the most critical regarding eating particular types of meat, as opposed to meat lovers (cluster 1) and compulsive meat eaters (cluster 4), who seem to consume every type of meat.

With respect to taking responsibility for reducing meat consumption, also differences across clusters exist (see Table 5.3.). Conscious flexitarians (cluster 3) agree the most with statements indicating that consumers in general and the respondent him or herself should reduce meat consumption, in contrast with meat lovers (cluster 1) and compulsive meat eaters (cluster 4). These “heavy” flexitarians also most strongly believe that the government should take action in reducing meat consumption, increase taxes or run campaigns. Meat lovers (cluster 1) and compulsive meat eaters (cluster 4) do not agree with such opinions, and the two remaining “medium” clusters partly agree with such statements.

Table 5.3. Preferred actions of societal institutions and food neophobia.

	Clusters					Total
	1	2	3	4	5	
Who should reduce meat consumption?						
Other parties	2.24 ^a	3.17 ^{b,c}	3.62 ^b	1.73 ^d	3.07 ^c	2.90
Consumers themselves	3.50 ^a	4.15 ^b	5.86 ^c	2.77 ^d	4.69 ^e	4.26
I myself	2.43 ^a	3.74 ^b	4.70 ^c	1.89 ^d	3.81 ^b	3.47
What should government do?						
Reduce meat consumption	2.33 ^a	3.30 ^b	4.42 ^c	1.69 ^d	3.23 ^b	3.14
Increase meat tax	1.51 ^a	2.58 ^{b,c}	2.95 ^c	1.31 ^a	2.26 ^b	2.26
Campaigns	2.72 ^a	3.66 ^b	5.02 ^c	2.30 ^a	3.98 ^b	3.62
What should supermarkets do?						
Reduce meat consumption	1.97 ^a	3.09 ^b	3.99 ^c	1.59 ^a	2.78 ^b	2.84
Increase meat alternatives	2.15 ^a	3.10 ^b	4.49 ^c	1.60 ^d	3.07 ^b	3.01
Promote meat	4.73 ^a	4.27 ^a	3.48 ^b	5.50 ^c	4.21 ^a	4.33
What should organizations do?						
Reduce meat consumption	2.31 ^a	3.32 ^b	4.43 ^c	1.78 ^d	3.52 ^b	3.18
Protest against cheap meat	2.64 ^a	3.50 ^b	4.80 ^c	2.08 ^d	3.88 ^b	3.47
Guide consumers	2.98 ^a	3.71 ^b	5.19 ^c	2.44 ^d	4.27 ^c	3.77
Food Neophobia						
Try new food	4.29 ^{a,b}	4.10 ^a	4.73 ^{b,c}	4.14 ^a	4.80 ^c	4.34
Don't trust new food	2.73 ^a	3.37 ^b	2.97 ^{a,b}	2.98 ^{a,b}	2.71 ^a	3.05
Don't try if ingredients unknown	3.05 ^a	3.58 ^b	3.88 ^b	3.00 ^a	3.45 ^{a,b}	3.45
Like ethnic food	5.53 ^a	4.84 ^b	5.70 ^a	5.48 ^a	5.73 ^a	5.31
Ethnic food looks weird	2.79 ^{a,b}	3.41 ^c	2.56 ^{a,d}	3.16 ^{b,c}	2.34 ^d	2.98
Try food at a dinner	4.21 ^a	4.06 ^a	4.47 ^{a,b}	4.02 ^a	4.71 ^b	4.23
Don't try unknown food	2.73 ^a	3.32 ^b	2.72 ^a	2.75 ^a	2.47 ^a	2.93
Being precise about food	3.51 ^a	3.73 ^a	4.54 ^b	3.55 ^a	3.95 ^a	3.85
I eat everything	5.07 ^a	4.48 ^b	4.84 ^{a,b}	5.11 ^a	5.12 ^a	4.80
Like to try new food in new rest.	4.26 ^{a,b}	4.05 ^a	4.55 ^{b,c}	4.26 ^{a,b}	4.76 ^c	4.28

Note. ^{a-c} In each row, different superscripts indicate significantly different cluster means ($p < .05$).

Corresponding differences in reactions across clusters are expressed as it comes to actions and responsibilities of supermarkets and other societal organizations with respect to addressing the reduction of meat consumption.

With regard to food neophobia, it appears that the (potential) flexitarians of the clusters 3 and 5 are the most willing to try new or unknown foods, whereas they also are fastidious about the type of food they eat. The other clusters are less open to try new foods.

5.4. Conclusions and discussion

To a considerable number of Dutch consumers eating meat is not always self-evident. Flexitarianism does exist. From the perspective of sustainability, flexitarianism may be qualified as a first and insufficient step towards more sustainable food consumption choices and patterns - particularly when meat is substituted by other animal-based products (e.g. fish, eggs, cheese) rather than plant-based substitutes. However, from the perspective of the dominance of meat eating habits in the current food culture the emerging trend of flexitarianism signifies a cautious break with carnivorous traditions and, therefore, contains a significant step towards a future of sustainable food consumption.

The identified clusters show that consumers contribute differently to sustainable food consumption habits or diets containing less meat. The meat consumption frequency of meat lovers and compulsive meat eaters is higher and in that sense more unsustainable compared to conscious flexitarians, for example. Although we did not study within-consumer conflicts, different clusters seemed to favor different motives. The two clusters of “medium” flexitarians (unconscious flexitarians and potential flexitarians) differ with respect to status derived from meat consumption, need for meat, and value for money. This result suggests different routes of sustainable policy making aimed at different clusters. For unconscious flexitarians, attractive and high-status meat alternatives may be offered to reduce meat consumption. Such offerings might be accompanied by information suggesting that consumers themselves are responsible for meat reduction in their diets. Since the cluster of unconscious flexitarians is relatively large, such a policy may be efficient. For potential flexitarians, price measures may be relatively effective. However, this cluster is relatively small, which renders such a policy less efficient.

We have attempted to improve our insight into different types of flexitarians by conducting a cluster analysis based on the segmentation variables measuring symbolic

and ethical associations with meat outlined above. Meat consumption was only analyzed in the cluster profiling. Mainly because meat consumption was excluded from the cluster variables, the clusters presented here differ partly from those reported in Dagevos and Voordouw (2013). There seems to be no specific rule for applying cluster analysis on behavioral variables or on background variables. Vanhonacker et al. (2013) use meat consumption in the cluster profiling, whereas Latvala et al. (2012) use meat consumption as input to the clustering procedure. This state of affairs makes it difficult to compare results across studies. For policy purposes it would be useful to study which measures affect meat consumption most effectively in different clusters.

The different strategies towards meat reduction discussed so far can be categorized into five broad strategies: (1) reducing meat portion size, (2) replacing part of the meat in meat-based products by plant-based alternatives (so-called hybrid meats), (3) consumption of meat substitutes (e.g. vegetarian burger), (4) replacing meat by other (animal-based or plant-based) protein-rich products and (5) leaving out meat from the dish without replacement. In addition to these five strategies, a sixth strategy deserves attention. If meat needs to be reduced because of environmental and animal welfare concerns meat could be replaced by other more environmentally-friendly and animal-friendly meat products (e.g. organic or free-range meat) (see Vanhonacker et al., 2013). This “weak”, product-related sustainable consumption-strategy could be applied in approaching consumer segments that highly value their meat consumption and are not willing to reduce it. In this way gains in terms of environmental impact and animal welfare issues can still be achieved to some degree (see De Jonge & van Trijp, 2013).

The five identified clusters need different approaches towards changing their meat consumption. The meat lovers do like meat a lot, but they do not express a high need for meat consumption. This offers opportunities towards meat reduction. Consuming smaller portions of meat, replacing meat in convenience food or consumption of hybrid meat products could be effective strategies. In addition, “light flexitarians” in cluster 1 could be willing to buy more environmentally-friendly and animal-friendly meat products, as this cluster expresses relatively high importance to environmental and animal welfare issues. This cluster also indicates that meat is worth its money and therefore might be willing to pay somewhat more for these more sustainable meat products. Health motivation appeared to be less strong in this cluster and therefore an approach through health messages does not seem very effective.

The unconscious flexitarians of cluster 2 perceive positive health effects of less meat, dislike animals as a source of meat, believe meat is rather expensive and indicate relatively little need for meat. However, they also indicate that meat consumption gives

status, and they do not appreciate meatless meals. Therefore this cluster might benefit from information and skills on preparing meatless meals. Fancy, tasty, low-meat meals could be attractive to them and may be perceived as relatively healthy. In contrast to the meat lovers, this cluster may be approached via “strong” curtailment strategies rather than the consumption of more sustainable meat products.

Cluster 3 of “heavy” conscious flexitarians has the most positive attitudes towards meat reduction and is most open for all possible meat-reduction strategies. This cluster should mainly be stimulated to enforce their current behavior (curtailment), for example, by providing the right context for making the flexitarian choice the easy choice, and by focusing on health and the environment.

The compulsive meat eaters of cluster 4 are probably the most difficult to change, as this cluster indicates a high need for meat, does not appreciate meatless meals and is not open to any of the meat reduction strategies. The only way to lower their meat consumption seems to be to improve “sustainability by stealth” through the implementation of rather unnoticeable innovations such as in hybrid meats a product-related strategy (De Bakker & Dagevos, 2012; Verain et al., 2012).

Finally, cluster 5 of potential flexitarians is characterized by a low need for meat, a relatively high appreciation of meatless meals and a high level of concern about environmental issues and animal friendliness. This cluster is also the least neophobic, indicating that these flexitarians are open-minded to changes in their diet. Possibly their current level of meat consumption is very much the result of dietary habits. Making these “medium” flexitarians more aware of ill-health effects and environmental consequences of low or moderate meat consumption, and informing them about meat alternatives and more sustainable dietary patterns, might be sufficient to amplify and consolidate their meat reduction behavior. Concluding, it appears that flexitarianism is a promising trend toward more sustainable food consumption. Different approaches and measures should be applied to help different food consumers to adjust their meat consumption to more sustainable levels.

Chapter 6

Attribute segmentation and
communication effects on healthy and
sustainable diet intentions



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Abstract

A shift towards more sustainable diets is urgently needed. Dietary guidelines state that changes towards less animal-based and more plant-based diets are beneficial in terms of sustainability of the diet and, in addition, will have a positive effect on public health. Communication on these guidelines should be most effective when tailored to the motivations of specific consumer segments. Therefore, the current study (1) segments consumers based on the importance they attach to sustainability, health, taste and price in several food categories, and (2) tests different ways of communicating the dietary guideline (with health arguments, sustainability arguments or both). Three segments have been identified: pro-self, average and sustainable conscious consumers. For pro-self and average consumers, the communication of both health and sustainability benefits made them think most about sustainability. For both pro-self and average consumers, communication based on the guideline did not result in changes in dietary intentions. Sustainable conscious consumers showed an increased intention to reduce their meat consumption, when both health and sustainability benefits were communicated. These findings show the importance of taking product category differences into account in studying consumer food motivations and intentions. In addition, the results indicate the importance of segmentation research in the development of dietary messages. Implications are formulated to effectively stimulate sustainable food choices.

6.1. Introduction

Food consumption patterns are increasingly related to health and sustainability challenges (Caballero, 2007; McMichaels, Powles, Butler, & Uauy, 2007). The high-energetic, animal-based and processed food products, which characterize mainstream western food consumption patterns, directly and indirectly cause collateral damage to environmental resilience, biodiversity, animal welfare, and fair trade. Contemporary food production is resource intensive and food accounts for almost a third of all greenhouse gas emissions in Europe (Garnett, 2011). Environmental, animal welfare and fairness issues can be shared under the concept of sustainability (Aschemann-Witzel, 2015; LNV, 2009; Reisch, Eberie & Lorek, 2013; Van Dam & van Trijp, 2011). In addition, current obesity levels form an important threat to public health since excess body weight is an important risk factor for type II diabetes, cardiovascular disease, and hypertension (Caballero, 2007; Ng et al., 2014). A shift towards more sustainable and healthy diets is urgently needed and a search for synergies between sustainability and health education is recommended to inform, motivate and involve consumers in order to achieve dietary changes (Aschemann-Witzel, 2015; Carlsson-Kanyama & Gonzáles, 2009; De Boer, Schösler, & Boersema, 2013; McMichael et al., 2007). Communicating dietary guidelines tailored to motive-based consumers segments is the focus of this research.

Many countries provide national dietary guidelines to inform their citizens and advise them on their food consumption. Currently, nutritional guidelines are focused on the healthiness of a diet, but debates on whether these guidelines should consider health and sustainability aspects of diets simultaneously are emerging. Recently, the Live Well for LIFE project funded by the EU and WWF formulated the following policy recommendation: “National governments should develop policies to give more balanced, integrated dietary recommendations on healthy and sustainable diets” (Alarcon & Gerritsen, 2014). In 2011, the Health Council of the Netherlands published a pioneering report in which guidelines for a healthy diet were evaluated from an ecological perspective (Health Council of the Netherlands, 2011). This report formulated two dietary guidelines which would lead to health and ecological gains simultaneously: the use of less animal-based and more plant-based diets and a decrease in energy intake from snacks and beverages for those with excess body weight. The advice for healthy and ecological diets will be considered in the formulation of the new Dutch dietary guidelines (Nutrition Centre of the Netherlands). In the US, a governmental advisory report with similar conclusions has been published recently

(Dietary Guidelines Advisory Committee, 2015). Currently, much debate is going on about whether these sustainability advices should be integrated in the new US dietary guidelines.

Changes towards more plant-based and less animal-based diets have been widely acknowledged in the scientific literature as benefiting healthiness and sustainability of present-day diets (Carlsson-Kanyama & Gonzáles, 2009; Health Council of the Netherlands, 2011; Reisch et al., 2013; Van Dooren, Marinussen, Blonk, Aiking, & Vellinga, 2014; Westhoek et al., 2014). A less animal-based diet would significantly reduce emissions, is beneficial in terms of animal welfare, and can improve public health (McMichael et al., 2007; Westhoek et al., 2014). In addition, increased consumption of fruits and vegetables would promote public health (Naska et al., 2000; Pomerleau, Lock, McKee & Altmann, 2004; Trichopoulou et al., 2003; Van 't Veer, Jansen, Klerk, & Kok, 2000; Van Rossum, Franssen, Verkaik-Kloosterman, Buurma-Rethans, & Ocké 2011). Consumers have an important role to play in the desired shift towards more healthy and sustainable diets (Aschemann-Witzel, 2015; Dagevos & de Bakker, 2015; Dagevos & Voordouw, 2013; Grunert, 2011; Heller, Keoleian, & Willett, 2013). So far, nutrition campaigns have had limited success in changing consumers' dietary patterns (Geeroms, Verbeke, & Kenhove, 2008). Current intake levels of fruits and vegetables are far below recommendations in most European regions as well as in the US, despite nutritional campaigns (Haack & Byker, 2014; Joffe & Robertson, 2001; Naska et al., 2000; Pomerleau et al., 2004; Van Rossum et al., 2011), and meat intake is too high in many affluent countries (Henchion, McCarthy, Resconi, & Troy, 2014; McMichael et al., 2007; Raphaely & Marinova, 2014). A possible reason for the ineffectiveness of food campaigns is the "one-size-fits-all approach" (Kazbare, van Trijp, & Eskildsen, 2010). As an antidote to this approach, the essential role of audience segmentation in developing effective communication is widely acknowledged (Hine et al., 2014; Moser, 2010; Kazbare et al., 2010; Noar, Benac, & Harris, 2007; Slater, 1996; Wilson, 2007). Consumers are heterogeneous and should be segmented into more homogenous subgroups with regard to key characteristics (Wedel & Kamakura, 2000). Food-related lifestyle variables are useful segmentation variables in this context, because of the cognitive insights they can provide and their close link with behavior (Wedel & Kamakura, 2000). Consumers can differ, for example, in the importance they attach to a range of food choice motives and related product attributes (e.g. Henchion et al., 2014; Onwezen et al., 2012; Realini et al., 2014; Steptoe, Pollard, & Wardle, 1995; Verain, Sijtsema, & Antonides, 2016). Food motives and attribute importance are important determinants of food choices (Bellows, Alcaraz, & Hallman, 2010; Pollard, Steptoe, &

Wardle, 1998) and are food-category specific (Verain et al., 2016). Because consumers differ in the importance they attach to food choice motives, they may also differ in the arguments and information that most appeal to them. Nutrition campaigns may benefit from developing tailored messages that fit the motives of the receiver, because motivation is an important determinant of the way in which a message is cognitively processed and perceived (Petty & Cacioppo, 1984).

In this context, it is useful to note two important distinctions across food choice motives. First, some motives relate to present-based benefits (e.g. price), whereas other motives relate to future-based benefits (e.g. health and sustainability) (Gad Mohsen & Dacko, 2013). Second, some motives are related to individual benefits (e.g. price or health) whereas other motives are related to social benefits (e.g. sustainability) (Aschemann-Witzel, 2015; Chrysosoidis & Krystallis, 2005). Intuitively, it seems favorable to focus on more than one motive in nutrition interventions, in order to ensure that arguments appeal to different consumers. In addition, a dietary change might be perceived as more attractive when multiple goals can be simultaneously satisfied by performing a single act. Kareklas, Carlson and Muehling (2014) show that an advertisement for organic meat that features both egoistic and altruistic arguments is more effective compared to an ad providing only egoistic motives or a control ad without arguments (but equally effective as an ad including only altruistic arguments). Such research findings suggest that the dietary guideline discussed above (less animal-based and more plant-based diets) might best be communicated as beneficial in terms of both health and sustainability.

On the other hand, there are several reasons to believe that it might not always be a good idea to combine arguments. Feiler, Tost and Grant (2012) show that people have lower donation intentions when egoistic and altruistic reasons to donate are combined, compared to either one of these reasons, because of increased persuasion awareness and higher psychological reactance. In addition, motives can sometimes be conflicting or being perceived as conflicting (Aschemann-Witzel, 2015). Consumers can, for example, believe that healthy options are less tasty (Raghunathan, Naylor, & Hoyer, 2006) or expect products to be of lower quality when the product is communicated as environmentally friendly (Newman, Gorlin, & Dhar, 2014). Third, a mismatch between a message and the audience can undermine the credibility and the persuasiveness of the message (e.g. Moser, 2010), which makes it important to cautiously tailor the message to the receiver.

The current study aims to identify and characterize motive-based consumer segments and to explore how the nutritional guideline, focusing on less animal-based and more plant-based consumption, can best be communicated to the identified segments in terms of their intention to consume according to this guideline.



6.2. Method

6.2.1. Data collection and participants

An online consumer survey was used to gather cross-sectional data in the Netherlands. A research agency collected the data in spring 2014. The sample was representative for the Dutch adult population in terms of age, gender and education. Selection criteria were used to exclude consumers who never or seldom make dinner choices and/or never or seldom shop for groceries. The survey consisted of two parts. The second part was filled out approximately one week after the first part. In the first part, the segmentation variables, the profiling variables and socio-demographic variables were assessed. In the second part, the respondents were randomly assigned to one of four experimental conditions. After the experiment respondent were asked to fill out the manipulation checks and the dependent measure items. In total, 1308 respondents filled out the first survey. Of these 1308 respondents, 829 respondents also participated in the experiment; 46.1% of whom were male and 53.9% were female. The respondents' age ranged from 18 to 90 years with a mean of 50.1 years¹.

6.2.2. Segmentation variables

The importance consumers attached to a range of food-category attributes was measured with 55 items. Price, taste, healthiness and a range of sustainability attributes (e.g. sustainability, environmental friendliness, waste, origin, transportation distance, animal friendliness) were included. The perceived importance of these attributes was assessed for each of four product categories (dairy, meat, fish and vegetables) as previous research showed that attribute importance is category specific (Verain et al., 2016). Attribute importance was measured with the following question: "I think it is important that [food category] is [product attribute]." An example item is: "I think it is important that dairy is animal friendly." The items were rated on seven-point Likert scales (1="Totally disagree," 7="Totally agree") (See also Verain et al., 2016).

Data reduction was applied by conducting an exploratory factor analysis (EFA) with oblique rotation on the 13 or 14 ratings for each of the four included product categories² separately to estimate the underlying factors. Though a detailed explanation

¹ The total Dutch population in 2014 consisted of 50.5% females and 49.5% males, with a mean age of 41.0 years. Education level was low for 30.4%, medium for 40.2% and high for 28.1% (1.2% unknown).

² For the categories of dairy, meat and fish 14 items were included, for the category of vegetables 13 items were included.

of the procedure is beyond the scope of this article (for more information, see Verain et al., 2016), eight factors emerged from the analysis: one pro-self factor including price, taste and health and one pro-social factor including all sustainability attributes for each of the four product categories. The total variance explained was 74.7% for dairy, 75.4% for meat, 76.8% for fish and 71.1% for vegetables. The correlations between the pairs of mean-centered factor scores were -.353 for dairy, -.362 for meat, -.135 for fish and -.404 for vegetables (all $p < .01$). The reliability scores (Cronbach's Alpha) for the eight factors ranged from .793 to .968. The resulting factor scores were mean centered per respondent, in order to cancel out response tendencies (Fischer & Milfont, 2010). Data reduction was checked with a confirmatory factor analysis (CFA) for each food category, each with two factors. Each of these models yielded comparable factor loadings and satisfactory fit^{3,4}, except for RMSE and, for vegetables, GFI.

6.2.3. Segment profiling variables

Profiling variables were used to gain more insight into the characteristics of the segments. Food intake, life values, time orientation, agreement and behavior regarding the dietary guideline, stages in the transition towards more healthy and towards more sustainable eating, and socio-demographic and background characteristics, were used as profiling variables.

Life values. Life values have been measured with a short version of Schwartz's value scale (1992), developed by De Groot and Steg (2008). The scale included egoistic, altruistic and biospheric values measured with 13 items. Respondents were asked to rate the importance of the 13 values "as guiding principles in their lives" on a seven-point scale (1="Very unimportant," 7="Very important"). The 13 items were included in a factor analysis with oblique rotation. Three underlying factors were identified. The first factor included all biospheric values and explained 37.8% of the item variance. Cronbach's Alpha of the four items was high ($\alpha = .90$). The second factor included all egoistic values and explained 20.7% of the item variance. Cronbach's Alpha could be improved by deleting "ambition." The remaining four items had a Chronbach's Alpha

³ A Root Mean Square Error (RMSE) below .07 (Steiger, 2007) and a Standardized Root Mean Square Residual (SRMR) below .08 indicate satisfactory model fit (Hu & Bentler, 1999). Comparative Fit Index (CFI), Non-Normed Fit Index (NNFI) indices and Goodness of Fit index (GFI) of at least .90 indicate a satisfactory model fit (Baumgartner & Homburg, 1996; Hu & Bentler, 1999).

⁴ Dairy: RMSE=0.09, NNFI=0.98, CFI=0.98, SRMR=0.03, GFI=0.93; Meat: RMSE=0.09, NNFI=0.98, CFI=0.98, SRMR=0.02, GFI=0.93; Fish: RMSE=0.11, NNFI=0.98, CFI=0.98, SRMR=0.03, GFI=0.91; Vegetables: RMSE=0.13, NNFI=0.96, CFI=0.97, SRMR=0.04, GFI=0.88.

of .78. The third factor included all altruistic values and explained 7.8% of the item variance. Cronbach's Alpha of the four items was .84. The three constructs have been computed by averaging the items.

Time orientation. A short version of the Consideration of Future Consequences scale (CFC) has been used to measure time orientation (Joireman, Shaffer, Balliet, & Strathman, 2012). Four items have been selected (items 1, 2, 10 and 11 of the original scale): the two items that scored highest on the consideration of future consequences factor and the two items that scored highest on the consideration of immediate consequences factor in a previous study (Antonides & Nyhus, in preparation). The items were measured on a 7-point scale (1="Totally disagree," 7="Totally agree"). The four items were captured by two factors (CFC-future and CFC-immediate), explaining 41.5% and 34.4% of the variance, respectively. Cronbach's Alpha of the scales were .69 and .67 respectively. Because of ease of interpretation, the two constructs have been computed by averaging the items.

Agreement and behavior regarding the dietary guideline. Two items have been included to measure agreement with and general behavior related to the dietary guideline stating the advice to eat less animal-based and more plant-based products. The items were: "A less animal-based (e.g. meat and dairy) and more plant-based (e.g. vegetables) diet is healthy and sustainable" and "While grocery shopping, I always consider the healthiness and the sustainability of the meal." The respondents were asked to indicate on a 7-point scale (1="Totally not," 7="Totally") whether they agreed with the statements.

Transition stages. Four statements about health and four statements about sustainability have been included to measure the transition stage of the respondent. These statements reflect the respondents' commitment to purchase healthy or sustainable food. The stages are based on the transtheoretical model developed by Prochaska and colleagues (e.g. Prochaska & Velicer, 1997) and represent a pre-contemplation stage, a contemplation stage, a preparation stage and an action and maintenance stage. The statements were adapted for healthy food and sustainable food from Gwozd, Netter, Bjartmarz and Reisch (2013). Respondents were asked to think about how important sustainability, respectively healthiness, are when they buy food. Subsequently they were asked to choose one of the four health statements and one of the four sustainability statements that best matched their considerations. The four statements were: "I base my food purchase decisions on price, taste, quality and/or convenience. I am not concerned with sustainability [health] issues and I don't think about them when I purchase food," "I believe that sustainability [health] is important, but it is too difficult

and time-consuming to base my food purchase decisions on them,” “When it is easy to do, I use sustainability [health] information on these issues in my purchase decisions,” and “I make an effort to learn about sustainability [health], and I am willing to pay more or sacrifice on product quality in order to use sustainability [health] in my food purchases.”

Food intake. Thirteen items were included in the survey to measure food intake. The respondents were asked to indicate how many days a week (0 to 7) they ate a range of products or meals. The included items were: 1) organic meat, organic fruits and vegetables, organic dairy, organic eggs, free range meat, products with a sustainability logo, 2) small portions of meat, small portions of dairy, small portions, seasonal vegetables, 3) vegetarian burgers, no meat, and 4) no dairy. Four underlying factors were identified. The first factor included consumption of sustainable products and explained 32.0% of the item variance. Cronbach’s Alpha of the six items was high ($\alpha=.85$). The second factor included items concerning the consumption of small portions of food products and seasonable food and explained 13.4% of the item variance. Cronbach’s Alpha of the four items was .64. The third factor included consumption of vegetarian meals and explained 10.4% of item variance. Cronbach’s Alpha of the remaining two items was .52. The last factor consisted of only one item, dairy-free meals, and explained 8.5% of item variance. Because of ease of interpretation, the constructs have been computed by averaging the items, thus indicating the average frequency of consuming a particular food category.

Socio-demographics. Questions on gender, age, education, income, and family composition were included in the survey.

6.2.4. Experimental design

The experiment was a 2x2 (health arguments vs. sustainability arguments) full-factorial between-subjects design in which participants were randomly assigned to one of four conditions: 1) a health condition received information on health benefits of having a less animal-based and more plant-based diet; 2) a sustainability condition received information on sustainability benefits of having a less animal-based and more plant-based diet; 3) a health and sustainability condition received combined information; and 4) a control condition received neutral information on eating behavior (without health or sustainability arguments) (see Appendix I). After having read the information, the participants were asked to note a few words (one to five) that came to their mind when they thought about healthy eating, sustainable eating, healthy and sustainable eating, and eating in general, respectively in the four conditions, in order to induce them to think of



these aspects. In addition, they were asked to give an example of a healthy, a sustainable, a healthy and sustainable, or general food choice, respectively in the four conditions, again to induce them to think of these aspects.

6.2.5. Dependent measures

6.2.5.1. *Manipulation check*

Respondents were asked on a 7-point Likert scale (1=“Very little,” 7=“Very much”) to indicate to what extent the text they had just read made them think about healthiness, sustainability, price, taste and convenience of food. A second manipulation check was conducted by counting the number of times certain words were associated with the information texts in the four conditions.

6.2.5.2. *Meal intentions*

The dependent variables included a range of sustainable and unsustainable food choice intentions related to dinner options. Respondents were asked to indicate, for each of 26 dinner components, the number of days (0-7) in the following week they intended to choose that component for their dinner. The options differed in quantities of unsustainable food (meat and dairy) as well as in sustainability of the production method (e.g. organic and animal friendly), and components were related to one of four product categories: vegetables, dairy, meat and “other.” Five underlying factors were identified with a total explained variance of 67.0%. The first factor included consumption intentions of sustainable products and explained 38.1% of the item variance. One item, consumption of small portions of meat, has been removed from the scale in order to improve its reliability. The remaining six items had a Cronbach’s Alpha of .92. The second factor included items concerning intentions to consume meals with (regular and large amounts of) meat and explained 12.9% of the item variance. Removing the item concerning consumption of large amounts of meat improved the reliability of the scale. Cronbach’s Alpha of the remaining three items was .84. The third factor included items concerning intentions to consume meals with (regular) dairy and explained 6.7% of the item variance. Deletion of the item concerning the intention to consume small amounts of dairy improved the reliability of the scale leading to a Cronbach’s Alpha of .86 for the remaining three items. The fourth factor included items concerning intentions to consume meals with vegetables and regular products and explained 5.1% of the item variance. Cronbach’s Alpha of the four items was .75. The final factor included consumption intentions of large amounts of meat, large amounts of vegetables and

products that can be used as meat replacers (nuts, fish, meat replacers, legumes) and explained 4.2% of item variance. Cronbach's Alpha of the eight items was .88. The factors were moderately correlated, with values ranging from .11 to .52. Because of ease of interpretation, the constructs have been computed by averaging the items.

6.2.6. Data analysis

The mean-centered factor scores on the importance of product-category attributes were used as segmentation variables in a two-step cluster analysis, performed in the Statistical Package for Social Sciences (SPSS 22). In the first step, a hierarchical agglomerative clustering procedure defined the number of clusters (Ketchen & Shook, 1996). Log-likelihood was used as distance measure (SPSS Inc., 2010). Cluster centroids were determined to be used as initial starting points in the second step (Hair, Black, Babin, Anderson, & Tatham, 2006; Ketchen & Shook, 1996). In the second step, K-means clustering was used to group respondents into the final clusters (SPSS Inc., 2010). Merging of clusters may depend on the input order of the cases (SPSS Inc., 2010) and therefore, analyses were run 10 times with randomly ordered cases (Onwezen et al., 2012; Wedel & Desarbo, 2002). Based on a combination of the lowest Bayesian Information Criterion (BIC) in the 10 runs, the agglomeration schedule and interpretability, the final cluster solution was chosen. Differences between the resulting segments on the profiling variables were investigated through ANOVA and Chi-square tests, depending on the measurement scale of the variable.

To assess the impact of the experimental manipulation, one-way between-subjects ANOVAs were carried out on the first manipulation check (the extent to which the manipulation made the respondent think about healthiness, sustainability, price, taste and convenience). The same analyses were repeated per identified segment, in order to see whether the manipulation differed in effectiveness across segments. For the second manipulation check, i.e. the open-ended association task, two researchers recoded the words that were mentioned into broader categories and reached agreement in the categorization of the words. Frequencies of categories with more than 20 counts were compared across conditions using Chi-squared tests. For the main analyses, a general linear model was used to test the main effect of experimental manipulation, the main effect of segment, and the interaction between manipulation and segment. The dependent variables were the five factors representing meal intentions.

6.3 Results

Table 6.1. Cluster centroids.

	Cluster		
	Pro-self Mean (sd)	Average Mean (sd)	Conscious Mean (sd)
N	116 (14.0%)	253 (30.5%)	460 (55.5%)
Dairy_Sustainable	-0.80 ^a (.68)	-0.19 ^b (.32)	0.31 ^c (.32)
Dairy_Healthy/Tasty/Affordable	0.75 ^a (1.14)	0.22 ^b (.43)	-0.31 ^c (.46)
Meat_Sustainable	-0.70 ^a (.79)	-0.18 ^b (.35)	0.27 ^c (.37)
Meat_Healthy/Taste/Affordable	0.90 ^a (1.00)	0.26 ^b (.38)	-0.37 ^c (.58)
Fish_Sustainable	-0.84 ^a (.84)	-0.18 ^b (.32)	0.31 ^c (.31)
Fish_Healthy/Tasty/Affordable	0.27 ^a (1.52)	0.24 ^a (.38)	-0.20 ^b (.42)
Vegetables_Sustainable	-0.63 ^a (1.03)	-0.31 ^b (.40)	0.33 ^c (.31)
Vegetables_Healthy/Tasty/Affordable	1.04 ^a (.50)	0.14 ^b (.42)	-0.34 ^c (.51)

Note. ^{a-c} Different superscripts indicate significantly different means in each row following ANOVA post-hoc Tukey tests at $p < .05$.

6.3.1. Segmentation on food category attribute importance

The first step in the data analysis was the classification of respondents into homogenous consumer segments. The cluster analysis resulted in three segments with relatively homogenous importance ratings of the food category specific attributes. The cluster centroids are shown in Table 6.1.

Segment 1: pro-self consumers.

Cluster 1 was the smallest segment including 14.0% of the respondents. This cluster scored relatively high on all pro-self factors and relatively low on all sustainability factors. Apparently, the relative importance of pro-self attributes (price, taste and health) was higher in this cluster compared to the other clusters. Therefore, this cluster was labelled the pro-self cluster. The pro-self cluster consisted of 53% males and the mean age was 47 years.

Segment 2: average consumers.

Cluster 2 represented 30.5% of the respondents. Respondents in this cluster attached about average importance to pro-self factors and sustainability factors for all product categories. Therefore this cluster was labelled “average consumers.” The average cluster consisted of 50% males, and the mean age was 50 years. This segment had the highest number of respondents in the youngest age group (18-29 years).

Segment 3: sustainable conscious consumers.

Cluster 3 was the largest cluster, representing 55.5% (N=460) of the sample. This cluster attached relatively high importance to the sustainability attributes compared to pro-self attributes. Therefore, this cluster was labelled “sustainable conscious consumers” (or “conscious consumers” in short). Cluster 3 consisted of 58% females and had the highest mean age of 53 years, and the highest percentage of people over 65 years of age.

The segments did not show any significant differences in education, income and household composition. In addition, the segments did not differ in the number of times per week the respondents cooked a hot meal, went for grocery shopping, or decided what would be served for dinner.

6.3.2. Life values and time orientation

Both egoistic values ($F(2,826)=4.39, p<.05$) and biospheric values ($F(2,826)=34.6, p<.001$) differed significantly between segments. Pro-self consumers had a significantly lower mean score ($M=3.11$) on egoistic values than average consumers ($M=3.42$) and conscious consumers ($M=3.45$). Altruistic values showed no significant differences. Biospheric values were lowest for pro-self consumers ($M=4.60$), followed by average consumers ($M=5.21$), and conscious consumers had the highest mean score on biospheric values ($M=5.58$). Peace, equality and justice were the most important values for pro-self consumers as well as for average consumers. Conscious consumers also valued peace and equality most, but protection of nature scored on the third place for this segment.

Consideration of future consequences differed significantly between the segments ($F(2,826)=21.855, p<.001$) with conscious consumers ($M=4.43$) considering future consequences more than the pro-self consumers ($M=3.71$) and average consumers ($M=3.98$). Consideration of immediate consequences did not differ significantly across segments ($M=3.78$ for pro-self consumers, $M=3.72$ for average consumers, and $M=3.56$ for conscious consumers).



6.3.3. Agreement with the guideline and related behavior

Agreement with the guideline ($F(2,826)=37.289, p<.001$) and the consideration of healthiness and sustainability in food purchasing ($F(2,826)=80.570, p<.001$) both differed significantly across segments. Pro-self consumers ($M=4.08$) and average consumers ($M=4.38$) agreed to a lesser degree that eating less animal-based and more plant-based food provides health and sustainability benefits than conscious consumers ($M=5.15$). Pro-self consumers also considered health and sustainability least while grocery shopping ($M=3.09$), followed by average consumers ($M=3.86$) and conscious consumers considered health and sustainability most ($M=4.77$).

6.3.4. Transition stage

A large part of pro-self consumers were in the first stage of the transition towards sustainable (69.8%), and healthy food choices (42.2%). About half of the average consumers were in the first stage of the transition towards sustainable consumption, but they were equally divided over the transition stages towards healthy food consumption. Conscious consumers were about equally divided over the transition stages towards sustainable consumption, but more than a third (36.5%) were in the most progressed stage (stage 4) towards healthy food consumption, indicating that health was important in their food purchases.

6.3.5. Food intake

Intake of sustainable food products ($F(2,826)=86.152, p<.001$), small portions ($F(2,826)=7.185, p<.01$), and vegetarian meals ($F(2,826)=13.299, p<.001$) all differed significantly between the segments. Pro-self consumers consumed sustainable products least frequently ($M=0.51$), followed by average consumers ($M=1.04$) and conscious consumers consumed sustainable products most frequently ($M=1.98$). Regarding the intake of small portions, pro-self consumers scored significantly lower ($M=2.84$) as compared to average consumers ($M=3.19$) and conscious consumers ($M=3.41$). Vegetarian intake was significantly more frequent for conscious consumers ($M=1.24$) than for pro-self consumers ($M=0.74$) and average consumers ($M=0.81$).

6.3.6. Effect of communication on thoughts and meal intentions

Overall, the manipulation checks showed no differences across conditions in the extent to which the provided information made the respondents think of healthiness, convenience and price. However, respondents in both the sustainability condition, and the health and sustainability condition, had started to think more about sustainability

than those in the health and control conditions ($F(3,825)=12.373, p<.001$). In addition, respondents in the control condition thought more about taste than those in the other conditions ($F(3,825)=12.598, p<.001$) (see Table 6.2).

Concerning differences between segments in the amount of thoughts after the manipulations, several significant differences can be found (see Table 6.2). Respondents in the pro-self segment who received health and sustainability arguments indicated that the information made them think more about sustainability compared to pro-self consumers in the control group ($F(3,112)=3.311, p<.05$). In addition, taste showed a significant result ($F(3,112)=3.173, p<.05$), but no significant differences between the four conditions have been found in a post hoc test. For average consumers, differences across conditions were found for sustainability thoughts ($F(3,249)=3.022, p<.05$) and taste thoughts ($F(3,249)=5.430, p<.01$). Respondents in the health and sustainability condition thought more about sustainability than respondents in the healthy condition. In addition, respondents in the control condition thought more about taste compared to those in the healthy and sustainable, and sustainable conditions. For conscious consumers, also thoughts about sustainability ($F(3,456)=4.457, p<.01$) and taste ($F(3,456)=6.171, p<.001$) differed across conditions, but the pattern of differences between conditions differed slightly from what had been found for the average consumers (see Table 6.2). Those in the sustainable condition thought more about sustainability than those in the control and healthy conditions. In addition, those in the control condition thought more about taste compared to the other conditions.

The results of the open-ended question in which respondents were asked to mention a few words that came up after they read the manipulation confirmed the manipulations (see Appendix II). Those in the control condition mentioned taste most often. In addition, product groups such as meat, bread, potatoes, pasta and rice were often mentioned, just as general food aspects such as hunger, grocery shopping and cooking. Respondents in the sustainable, and the healthy and sustainable condition, most often thought about all kinds of sustainability aspects such as environmentally friendly, Fair Trade, animal friendly, regional, ecological, seasonal and vegetarian, but also expensiveness was mentioned frequently in these conditions. Respondents in the health condition mentioned fruits and vegetables most often, but also respondents in the health and sustainable condition mentioned fruits and vegetables frequently. In addition, calories, dairy, vitamins and minerals, fibers and variety of food were often mentioned in the health condition. Calories were also mentioned frequently in the combined condition. Finally, respondents in the health, sustainable and combined conditions thought of natural production and pureness more often than those in the control condition.

Table 6.2. Manipulation check: “To what extent did the text above made you think of the following aspects of food?” (1=“Very little,” 7=“Very much”).

Communication type	N	Attributes				
		Health	Sustainability	Price	Taste	Convenience
<i>Total sample</i>						
Control	209	4.90 ^a	3.98 ^a	4.68 ^a	5.74 ^a	4.64 ^a
Healthy	205	5.02 ^a	4.04 ^a	4.37 ^a	5.16 ^b	4.49 ^a
Sustainable	210	4.91 ^a	4.65 ^b	4.70 ^a	5.02 ^b	4.32 ^a
Healthy & sustainable	205	5.00 ^a	4.71 ^b	4.68 ^a	5.01 ^b	4.46 ^a
<i>Pro-self consumers</i>						
Control	35	4.09 ^a	2.51 ^a	4.26 ^a	5.60 ^a	4.20 ^a
Healthy	33	5.03 ^a	2.97 ^{a,b}	4.64 ^a	5.24 ^a	4.61 ^a
Sustainable	29	4.07 ^a	3.55 ^{a,b}	4.66 ^a	4.45 ^a	3.76 ^a
Healthy & sustainable	19	4.26 ^a	3.79 ^b	3.79 ^a	4.37 ^a	3.74 ^a
<i>Average consumers</i>						
Control	73	4.90 ^a	3.81 ^{a,b}	4.66 ^a	5.71 ^a	4.63 ^a
Healthy	63	4.92 ^a	3.71 ^a	4.19 ^a	5.10 ^{a,b}	4.19 ^a
Sustainable	64	4.67 ^a	4.23 ^{a,b}	4.52 ^a	4.95 ^b	4.05 ^a
Healthy & sustainable	53	5.04 ^a	4.40 ^b	4.62 ^a	4.85 ^b	4.43 ^a
<i>Conscious consumers</i>						
Control	101	5.18 ^a	4.61 ^a	4.85 ^a	5.80 ^a	4.79 ^a
Healthy	109	5.08 ^a	4.56 ^a	4.39 ^a	5.17 ^b	4.63 ^a
Sustainable	117	5.26 ^a	5.15 ^b	4.80 ^a	5.20 ^b	4.61 ^a
Healthy & sustainable	133	5.09 ^a	4.97 ^{a,b}	4.83 ^a	5.17 ^b	4.57 ^a

Note. ^{a-b} Means with differing superscripts within columns (per cluster) are significantly different at $p < .05$ based on ANOVA post-hoc Tukey tests.

Table 6.3. Consumption intention (in number of days of the following week).

	Sustainable products	Regular meat	Regular dairy	Vegetables and regular products	Meat replacers, and large amounts of vegetables and meat
Pro-self consumers	0.68 ^a (1.08)	4.36 ^a (1.83)	2.95 ^a (2.42)	4.45 ^a (1.67)	1.43 ^a (1.40)
Average consumers	1.31 ^b (1.58)	3.96 ^a (1.75)	2.99 ^a (2.16)	4.39 ^a (1.51)	1.55 ^a (1.40)
Conscious consumers	2.56 ^c (1.93)	3.38 ^b (1.99)	3.15 ^a (2.21)	4.25 ^a (1.58)	2.21 ^b (1.64)

Note. ^{a-c} Different superscripts within one column indicate significantly different intentions.

A multivariate ANOVA (see Table 6.3.) shows that the main effect of experimental manipulation condition was not significant for any of the intentions (not shown in Table 6.3.). The main effect of segment was significant for intentions to consume sustainable products ($F(2,817)=72.267, p<.001$), intentions to consume regular meat ($F(2,817)=14.616, p<.001$) and intentions to consume vegetarian meals ($F(2,817)=21.077, p<.001$). Pro-self consumers intended to eat less sustainable products compared to average consumers, and conscious consumers intended to eat more. Conscious consumers also intended to eat more products replacing meat in the meal than the other two segments. In addition, conscious consumers intended to eat meat less regularly. In addition, there was a significant interaction between the manipulation condition and segment for regular meat intentions ($F(6,817)=2.179, p<.05$, not shown in Table 6.3.). A subsequent one-way between-subjects ANOVA with post-hoc Tukey test per segment shows that for sustainable conscious consumers, intentions to consume regular types and portions of meat were significantly lower ($M=4.01$) than in the control condition ($M=4.89$) ($F(3,456)=3.892, p<.01$).

No significant differences were found in attitudes towards the food consumption guideline (to eat less animal-based and more plant-based diets) between conditions within the clusters. The only significant difference was that, overall, those in the combined condition scored higher than those in the healthy condition on the question whether the information that they had read made them think about the amount of animal-based and plant-based products that they ate.

6.4. Discussion

This study revealed the potential of targeting dietary messages to lifestyle-based consumer segments. Segmentation may allow nutritional campaigns to reach specific audiences with the most effective message, tailored to their motivations. This study shows the importance of consumer segmentation, as well as the focus on the product-category level, in the development of effective dietary communication. Implications of the findings will be considered in more detail below.

This study has proposed to segment consumers based on food category attribute importance. Three consumer segments have been identified: “pro-self consumers,” “average consumers” and “sustainable conscious consumers.” For the identification of the segments, this study used a domain-specific segmentation base. The identification of homogeneous subgroups was based on people’s reasons and motivations behind their food choices instead of more general descriptive variables (e.g. socio-demographics) that are commonly used as segmentation base (Verain et al., 2012). Food-related motivations are more closely related to behavior and are therefore preferred to more abstract variables in identifying segments (Van Raaij & Verhallen, 1994). The current study adds to the literature by considering food-category differences in domain-specific motivations (see also Verain et al., 2016).

This study replicated and extended an earlier segmentation study based on product-category attribute importance (Verain et al., 2016). The replication of the segmentation procedure almost three years after the initial study showed similar results, indicating the stability of the segments. Segment sizes slightly changed with an increase of just over ten percent of the sustainable conscious segment, mainly at the expense of the size of the average consumer segment. This finding looks promising as it shows that the proportion of the population for whom sustainability attributes are relatively important has increased. The factor analysis also replicated the underlying factor structure of a pro-self factor (capturing taste, price and healthiness) and a sustainability factor (capturing a range of sustainability aspects such as animal welfare and environmental welfare) for each of the food categories (dairy, meat, fish and vegetables). This replication again underpins the significance of considering food category differences in attribute importance. In addition, this replication confirms that sustainability can be used as a container construct, because several sustainability dimension such as environmental aspects and animal welfare aspects loaded on one dimension.

The main added value of this study as compared to the previous study is twofold. First of all, the current study extends previous findings by gaining deeper insights into the

segment profiles. The segments differed in food consumption, personal characteristics and food-related lifestyle aspects; elements which should be taken into consideration in the development of nutritional campaigns. Second, the current study provides insights into communication strategies towards the segments. Implications for the development of dietary communication will be discussed in the next section.

6.4.1. Implications for dietary communication strategies

The main aim of this study was to show how nutritional messages on healthy and sustainable diets should be tailored to different segments. The domain-specific lifestyle and personal characteristics of the three segments identified here imply some strategies for communicating dietary guidelines to each of the segments. The results show, however, that the same option – the strategy in which health and sustainability messages were combined – can best be used for all three segments. In other words, there was no strategy that showed to be significantly more effective than the combined condition in any of the segments. This is an unexpected result because we assumed that segments needed different communication strategies. Besides being unexpected, it is an interesting result. It shows that even those consumers who are less motivated to make healthy and sustainable food choices may benefit from information on healthy and sustainable diets. Although the information may not result in changing meal intentions, it makes consumers think more of sustainability and less of taste. In addition, based on our results, no negative effects are expected in any of the segments from communicating health and sustainability benefits of less animal-based and more plant-based diets.

Although we found that the most effective communication strategy is the same for all segments, results do indicate the relevance of identifying consumer segments based on product-category attribute importance. We should tailor dietary communications to the characteristics and motivations of consumers. A positive effect of the communication on sustainable dietary intentions has been found for sustainable conscious consumers only. The other two segments may need other strategies to stimulate them to shift their diets towards more sustainable consumption levels. An option might be to consider the addition of pro-self motives in the formulation of, and communication on dietary guidelines. In accordance with a flood of food studies, this study shows the importance of taste, price and convenience to food consumers. The lack of consideration of these attributes may be a reason why communication of dietary guidelines shows limited effectiveness in the real world. Synergies between pro-self short-term motives, and healthy and sustainable choices have to be found. An example could be the stimulation of seasonal fruit and vegetable consumption by emphasizing their low price and good



taste, next to their possible health and sustainability gains. In the formulation of dietary guidelines, a broader perspective could also be helpful. An example can be found in the guidelines that have been introduced in Brazil in 2014 (see Vreugdenhil, 2014). These guidelines consist of ten steps towards a healthy diet that leave freedom of choice and do not dictate day-to-day intake levels. These guidelines represent a much more holistic view on food intake as compared to guidelines in the EU and the US, by including advice such as “eat regularly and carefully in appropriate environments and, whenever possible, in company,” “develop, exercise and share cooking skills,” “plan time to make food and eating important in your life,” and “be wary of food advertising and marketing.”

Furthermore, our insights into personal characteristics of the segments can be used in developing effective strategies. It may be beneficial, for example, to make a future orientation more salient for pro-self and average consumers. This study has shown that pro-self consumers differ from sustainable conscious consumers at this point. In addition, messages can be adapted to the transition phase in which a consumer is positioned. For instance, in the pre-contemplation phase, it is important to raise consumers’ awareness of health and sustainability problems. In the contemplation stage, one’s self image is crucial and can be influenced by providing role models, for example. In the preparation stage, it is important to make consumers believe that they can change, for instance by providing a range of practical options. Consumers in the action and maintenance stage can be helped by prompting healthy and sustainable choices (Prochaska & Velicer, 1997).

The results underpin the importance to take product-category differences into account. First of all, the communication of the dietary guideline seems to have an effect on intentions, if only for the product-category of meat. Second, the factor analysis on intentions shows that consumption of regular portions and regular variants of meat, dairy and vegetables load on different underlying factors. This implies that the guideline to consume less animal-based products might be too general. Motivational differences exist concerning meat and dairy, and it might be better not to lump these product categories together in the same message.

Furthermore, the results show that the effect of communicating the guideline is only found for the curtailment of meat, and not for the purchase of sustainably produced meat products (e.g. organic or animal friendly variants) (see Verain, Dagevos, & Antonides, 2015). This finding is not surprising, as the guideline is focused on curtailment behavior, and not on stimulating the purchase of sustainably produced products, but it shows that the effect does not lead to spillovers to other types of sustainable behavior. This implies that communication aimed at stimulating sustainably

produced products, may have additional beneficial effects on stimulating sustainable diets.

In short, we can conclude that it is not so much the nature of the message (healthiness and/or sustainability argument) that is key in differentiating between segments, but the relation between message, segment and product category. Those involved in communicating dietary guidelines could choose to use a mix of pro-self and pro-social arguments for all consumer segments, as including both types of arguments might appeal to a larger audience. The current study did not find any negative effects on either thoughts or meal intentions of a frame that combines health and sustainability in any of the segments. Therefore, we propose to place dietary guidelines in a context of both healthiness and sustainability, and to combine both health and sustainability arguments. In other words, sustainability should become part of the criteria on which dietary guidelines are formulated and communicated. Overall, the results imply that in the development of dietary messages:

- Product-category differences should be taken into account.
- Differences between attribute-based segments should be taken into account.
- The type of sustainability that is targeted, curtailment versus sustainable products, should be taken into account.
- Communication strategies seem insufficient to shift diets, especially among pro-self and average consumers, and therefore additional strategies should be considered.

6.4.2. Limitations and suggestions for future research

Although this research has some important implications, it also faces some limitations and raises some important issues for future research. First, the health manipulation did not result in more health thoughts. A possible explanation is that at the baseline level (regardless of any communication) health is more salient in the consumer's mind than sustainability. Therefore it is harder (and maybe unnecessary) to increase health thoughts through communication. We do not perceive it as a problem that the health manipulation check did not show significant differences between conditions, because the open-ended question on association words showed that the manipulation has been read and understood, because respondents mentioned health-related words⁵.

⁵ Those in the health manipulation mention "health" least often. This is a logical result of the way we framed the question, as we asked them to mention words that came to their mind when thinking of healthy food.



In addition, the Health Council of the Netherlands (2011) has formulated a second guideline which provides synergy between health and sustainability: decreasing the consumption of non-basic food items (e.g. snacks and sweet beverages) for those facing overweight and it would be interesting to investigate whether similar results can be found for this guideline. Because this guideline centers around other food categories, it is possible that different conclusions should be drawn as compared to the current study. Furthermore, future research should include a broader range of communication conditions to check the effect of combining short-term pro-self motives (e.g. taste, price and convenience) with long-term pro-social motives (sustainability) and/or long-term pro-self motives (health). All segments, and the pro-self segment specifically, could be attracted with messages including those pro-self short-term motives. Such additional communication strategies may result in relatively large differences in effectiveness between segments. Furthermore, additional attribute combinations may give insights into whether a combination of two attributes is more effective than focusing on a single attribute. The current study cannot be conclusive on whether the health and sustainability condition shows the best results because of the synergy of the two arguments or because of the fact that two arguments are included in this condition as compared to one argument in the other conditions. We did, however, keep the information comparable in length by shortening the length of both arguments in the combined condition, and therefore it is most likely that the effect occurs because of synergy. Another argument to support this reasoning is that from previous research (Verain et al., 2016) we know that sustainable conscious consumers perceive the most synergy and pro-self consumers perceive the least synergy. If the effect of the health and sustainability manipulation was due to the number of arguments, than the largest effect would be expected to occur for pro-self consumers, whereas if it were the synergy perception, the largest effect would be expected to occur for conscious consumers (which is the case).

Moreover, this research has focused on the motivational pathway towards more sustainable dietary patterns. Results show that communicating the guideline only results in improved intentions for the segment that is already motivated (sustainable conscious consumers). Agreement with the guideline does not differ between conditions within segments, indicating that communicating the guideline has no effect on agreement. Therefore, it is likely that for pro-self and average consumers, dietary communications that can increase knowledge or awareness will not result in changes in consumption. Therefore, other pathways should be considered, that are less cognitive and motivational in nature, such as nudging strategies or legal measures (e.g. taxes, subsidies or prohibitions of certain products).

Another interesting direction for future research can be found in the spillover literature (Thøgersen & Crompton, 2009). Based on the current study it can be concluded that the best communication strategy is to include a combination of health and sustainability arguments. It seems intuitive to persuade people that sustainable behavior is in their own interest, for example by stressing the health or price benefits that come along with certain sustainable behaviors. Previous research showed, however, that making self-interest motivations salient may counteract prosocial motivations and therefore it may prevent positive spillover from one prosocial behavior to other prosocial behaviors (Evans et al., 2013; Thøgersen & Crompton, 2009). Future research should provide more insights into positive or negative spillover effects resulting from communication strategies.

Overall, this study puts forth a preliminary segmentation based on food category specific food motivations that may help develop effective dietary communication strategies motivating consumers towards more healthy and sustainable diets. We can conclude that communicating both health and sustainability benefits of eating less animal-based and more plant-based products is advisable, but additional ways of stimulating sustainable food consumption are needed, especially for pro-self and average consumers. The effectiveness of the communication in terms of sustainable food intentions depends on the segment as well as on the product category. Future research is needed to study the generalizability of the findings to other guidelines, in other food categories, with other product attributes and considering the entire diet, but this study leads to useful insights for those who are involved in communicating healthy and sustainable dietary guidelines. Thereby this study contributes to a more healthy and sustainable food pattern.

Appendix I

The following manipulations have been used in the experiment (original Dutch text followed by the English translation).

Control condition:

Deze vragenlijst gaat over eten. Hiermee bedoelen we eetgedrag dat bijdraagt aan uw totale voedselinname gedurende de hele dag. U kunt hierbij bijvoorbeeld denken aan wat voor soort producten u eet en hoeveel u ervan eet. Het eten van drie hoofdmaaltijden en (eventueel) een aantal tussendoortjes bepaalt uw voedselinname. Het gaat om hoe u uw maaltijden samenstelt.

English translation: This questionnaire focusses on food. With this we mean dietary behavior that contributes to your total food intake during the entire day. You could think of the type of products you eat and the amount you eat of it. The intake of three main meals and (potentially) a number of snacks determines your food intake. It entails the way you compose your meals.

Health condition:

Deze vragenlijst gaat over gezond eten. Hiermee bedoelen we eetgedrag dat bijdraagt aan een goede gezondheid met een goede weerstand, weinig ziekte en een fit en energiek gevoel. U kunt hierbij bijvoorbeeld denken aan de verhouding dierlijke en plantaardige producten die u eet. Het eten van weinig dierlijke producten (zoals vlees en zuivel) en veel plantaardige producten (zoals groente) is gezond. Het gaat er om hoe gezond de maaltijden zijn die u samenstelt.

English translation: This questionnaire focusses on healthy eating. With this we mean dietary behavior that contributes to a good health with a good resistance, little illness and a fit and energetic feeling. You could think of the proportion of animal-based and plant-based products that you eat. The intake of little animal-based products (such as meat and dairy) and a lot of plant-based products (such as vegetables) is healthy. It entails the healthiness of the meals you compose.

Sustainability condition:

Deze vragenlijst gaat over duurzaam eten. Hiermee bedoelen we eetgedrag dat bijdraagt aan een duurzame wereld met respect voor het milieu, de dieren en de mensen om ons heen. U kunt hierbij bijvoorbeeld denken aan de verhouding dierlijke en plantaardige producten die u eet. Het eten van weinig dierlijke producten (zoals vlees en zuivel) en veel plantaardige producten (zoals groente) is duurzaam. Het gaat er om hoe duurzaam de maaltijden zijn die u samenstelt.

English translation: This questionnaire focusses on sustainable eating. With this we mean dietary behavior that contributes to a sustainable world, with respect for the environment, the animals and the people surrounding us. You could think of the proportion of animal-based and plant-based products that you eat. The intake of little animal-based products (such as meat and dairy) and a lot of plant-based products (such as vegetables) is sustainable. It entails the sustainability of the meals you compose.

Combined condition:

Deze vragenlijst gaat over gezond en tegelijk duurzaam eten. Hiermee bedoelen we eetgedrag dat bijdraagt aan een goede gezondheid en een duurzame wereld met respect voor het milieu, de dieren en de mensen om ons heen. U kunt hierbij bijvoorbeeld denken aan de verhouding dierlijke en plantaardige producten die u eet. Het eten van weinig dierlijke producten (zoals vlees en zuivel) en veel plantaardige producten (zoals groente) is gezond én duurzaam. Het gaat er om hoe gezond en duurzaam de maaltijden zijn die u samenstelt.

English translation: This questionnaire focusses on healthy and simultaneously sustainable eating. With this we mean dietary behavior that contributes to a good health and a sustainable world, with respect for the environment, the animals and the people surrounding us. You could think of the proportion of animal-based and plant-based products that you eat. The intake of little animal-based products (such as meat and dairy) and a lot of plant-based products (such as vegetables) is healthy AND sustainable. It entails the healthiness and sustainability of the meals you compose.



Appendix II

Number of times words in certain categories were mentioned in the four conditions.

	Control	Healthy	Sustainable	Healthy & sustainable	F-value
N	1045	1025	1050	1025	
Tasty	140 ^a	13 ^b	10 ^b	13 ^b	287.961***
Fruit and vegetables	70 ^a	263 ^b	30 ^c	86 ^a	327.226***
Healthy	47 ^a	5 ^b	40 ^{a,c}	21 ^c	38.152***
Meat	43 ^a	21 ^b	7 ^c	4 ^c	50.929***
Sociable	37 ^a	0 ^b	1 ^b	0 ^b	105.974***
Bread	34 ^a	11 ^b	1 ^c	6 ^{b,c}	49.080***
Cooking	28 ^a	0 ^b	0 ^b	0 ^b	83.627***
Potatoes	27 ^a	3 ^b	5 ^b	2 ^b	45.647***
Good	25 ^a	3 ^b	6 ^b	7 ^b	28.938***
Calories	24 ^a	86 ^b	4 ^c	27 ^a	112.505***
Pasta	18 ^a	1 ^b	1 ^b	0 ^b	44.874***
Hungry	15 ^a	0 ^b	0 ^b	1 ^b	40.187***
Fish	13 ^a	18 ^a	9 ^a	9 ^a	4.686
Grocery shopping	12 ^a	0 ^b	0 ^b	0 ^b	35.701***
Dairy	11 ^{a,b,c}	25 ^c	2 ^b	13 ^{a,c}	21.948***
Rice	10 ^a	1 ^b	0 ^b	0 ^b	25.494***
Nutritious	8 ^a	2 ^a	2 ^a	1 ^a	9.327*
Variety	6 ^{a,b}	16 ^b	0 ^a	1 ^a	28.553***
Vitamins & minerals	5 ^{a,b}	21 ^c	1 ^b	10 ^{a,c}	25.140***
Fresh	4 ^a	20 ^b	1 ^a	23 ^b	32.042***
Expensive	3 ^a	8 ^a	29 ^b	26 ^b	30.672***
Organic	2 ^a	29 ^b	73 ^c	81 ^c	94.831***

Vegetarian	2 ^a	1 ^a	6 ^{a,b}	13 ^b	16.517**
Natural	1 ^a	5 ^a	2 ^a	4 ^a	3.473
Water	1 ^{a,b}	8 ^b	0 ^a	3 ^{a,b}	12.968**
Animal friendly	1 ^a	1 ^a	21 ^b	14 ^b	31.975***
Nutrition guideline	1 ^{a,b}	9 ^b	0 ^a	1 ^{a,b}	19.558***
Wasting	1 ^{a,b}	0 ^b	9 ^a	1 ^{a,b}	18.847***
Regional	1 ^a	0 ^a	14 ^b	15 ^b	26.444***
Fiber	1 ^a	20 ^b	0 ^a	3 ^a	45.343***
No additives	1 ^a	7 ^a	7 ^a	6 ^a	4.792
Environmental friendly	0 ^a	0 ^a	27 ^b	19 ^b	48.839***
Fair Trade	0 ^a	0 ^a	23 ^b	21 ^b	44.464***
Natural production	0 ^a	7 ^b	13 ^b	20 ^b	22.287***
Ecological	0 ^a	2 ^{a,b}	11 ^b	11 ^b	17.063**
Seasonal	0 ^a	3 ^{a,b}	11 ^b	9 ^b	13.668**
Pure	0 ^a	8 ^b	4 ^{a,b}	8 ^b	9.083*
Responsible	0 ^a	0 ^{a,b}	7 ^b	6 ^{a,b}	13.119*
Don't know	0 ^a	3 ^a	30 ^b	23 ^b	46.928***

Note. ^{a-d} Different superscripts within one row indicate significantly different values.

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

Chapter 7

General discussion



7.1. Introduction

The aim of this thesis is to better understand sustainable food consumption. To provide the insights related to this aim, the thesis focusses on two key questions: (1) which consumer segments can be identified in the domain of sustainable food, and (2) how do these segments relate to other personal, lifestyle and behavioral variables related to sustainability and food? The selection of segmentation variables is crucial in answering the research questions. After a literature review (Chapter 2) on sustainable food segments, four segmentation studies have been conducted with three different segmentation bases in order to identify consumer segments related to sustainable food. The first segmentation basis included self-reported sustainable food behaviors, measured on the product-category level (Chapter 3). The second segmentation basis included motivational variables, operationalized as product-category attribute importance (Chapters 4 and 6). The third segmentation basis focused on the category of meat, and included a range of meat-related lifestyle variables (Chapter 5). In the different studies, profiling variables on three hierarchical levels (personal characteristics, lifestyle and behavior) have been included to provide better insights into the characteristics of the identified segments. By providing insights into consumer segments in the sustainable food domain this thesis aims to contribute to developing policies aiming at a shift towards more sustainable contemporary diets.

Several key lessons can be learned from this thesis:

- Sustainability is unidimensional in people's motives, intentions and behaviors (Chapters 3, 4 and 6) (See Section 7.2.1.);
- On the behavioral level, two types of sustainable consumption can be distinguished: curtailment and sustainable product choices (Chapter 3) (See Section 7.2.1.);
- Sustainable consumer segments exist, but other food choice motives are also important for these consumers and should not be neglected (Chapter 3, 4, 5, 6) (See Section 7.2.2.);
- Sustainability can be linked to health (Chapter 2, 4, 5, 6) (See Section 7.2.2.);
- Lifestyle-based segments need different approaches to shift their diets towards more sustainable consumption (Chapters 4, 5 and 6) (See Section 7.2.2.).
- All levels of the hierarchy of constructs (personal characteristics, lifestyle and behavior) are helpful in understanding sustainable food segments (Chapters 1, 2, 3, 4, 5, 6) (See Section 7.2.3.);
- Product-category differences in lifestyle variables should be considered (Chapter 4, 6) (See Section 7.2.4.).

The key lessons learned will be further elaborated upon in the next section. An overview of the main findings and theoretical contributions will be given. Thereafter, suggestions for future research will be discussed (Section 7.3), followed by the practical relevance of this thesis (Section 7.4) and some final conclusions (Section 7.5).

7.2. Main findings and theoretical contributions

This research can be placed in the fast growing literature on sustainable food consumption in a range of domains. The environmental domain focusses on the sustainability of dietary patterns and is more and more integrated with knowledge from the nutritional domain to provide insights on diets that are healthy and sustainable simultaneously (e.g. MacDiarmid, 2013; Rayner & Scarborough, 2013; Reynolds, Buckley, Weinstein, & Boland, 2014; Scarborough, Allender, Clarke, Wickramasinghe, & Rayner, 2012; Van Dooren, Marinussen, Blonk, Aiking, & Vellinga, 2014; Vetóné Móznér, 2014). Policy makers as well as other professionals concerned with the formulation of nutritional guidelines are increasingly aware of the importance of combining both these aspects (e.g. Alarcon & Gerritsen, 2014; Reisch, Eberie, & Lorek, 2013). At the start of this project, in 2010, the amount of food research that combined health and sustainability was still limited, but from that moment on, this literature has gathered momentum. Especially the switch towards a less animal-based and more plant-based diet is receiving scholarly interest nowadays (e.g. Graça, Calheiros, & Oliveira, 2015; Temme et al., 2013; Vinnari & Vinnari, 2013). More specifically, meat consumption and alternative proteins are topical issues receiving particular attention (Dagevos, 2014; Hallström, Rööös, & Börjesson, 2014; Raphaely & Marinova, 2014; Vanhonacker, van Loo, Gellynck, & Verbeke, 2013; Verbeke, 2015; Zur & Klöckner, 2014). We add to this literature in several ways. First, we take a consumer perspective, and use a lifestyle segmentation approach in order to consider consumer differences. In addition, we contribute to the existing literature by providing a holistic approach in which a range of sustainability dimensions are included, and not just one dimension, as is common in the current literature. Furthermore, we pay attention to product-category differences, which is highly relevant in the domain of sustainable food consumption, but is not often considered yet. Next, the current research bridges the gap between literature on the acquisition of sustainably produced products, which is mainly based in the marketing literature (e.g. Moser, 2015), and literature on consumption curtailment, which is more based in the fields of sociology and nutrition. Chapter 3 shows that both types of sustainable consumption can be empirically distinguished and are useful to be

considered simultaneously because they address different consumer types. With this finding we extend insights from the energy domain into the domain of food (Jansson, Marell, & Nordlund, 2009). In the next sections, the main findings and key lessons derived from our research perspective will be discussed.

7.2.1. Sustainable food consumption

Sustainability is a multidimensional concept, and based on the literature we identified three main components of sustainability in relation to food: an environmental component, an animal welfare component, and a fair trade component. In Chapter 2 we found that the majority of segmentation studies include only one of these components (e.g. Bezençon & Blili, 2011; Coelho, 2015; De Jonge & van Trijp, 2013; De Jonge, van der Lans, & van Trijp, 2015; Nasir & Karakaya, 2014; Vanhonacker & Verbeke, 2009). In our studies, we included all three components to obtain a complete picture of sustainable food consumer segments. Surprisingly, we found that all components were explained by one sustainability factor. This is true on the level of general food motives (Chapter 4), product-category-specific attribute importance (Chapters 4 and 6), sustainable food consumption intentions (Chapter 6), and food consumption behaviors (Chapters 3 and 6). Unidimensionality of sustainability motivations is in line with the work of Van Dam and van Trijp (2011), who show that light users of sustainable products can cognitively distinguish sustainability dimensions, but in terms of motivation, all sustainability attributes lump together into one dimension. We found a similar result for a representative sample of the Dutch population. In addition, we show that this finding also holds for food consumption intentions and behaviors.

Although we did not find a distinction in sustainability dimensions, in Chapter 3 we found a distinction between two types of sustainable behaviors: curtailment of consumption in unsustainable product categories, and consumption of sustainably produced products. These two types of sustainable behaviors have been identified in the literature before (e.g. Hoogland, de Boer, & Boersema, 2005; Ravn Heerwagen, Mørch Andersen, Christensen, & Sandøe, 2014), but have never been tested empirically for food. We show that curtailment behaviors and sustainable product choices can be distinguished empirically as two types of sustainable behavior. In addition, we show that consumers differ in the type of sustainable behavior they prefer.

In short, we found that several sustainability dimensions can be captured by one container construct. In contrast, we added a new distinction to the literature between two types of sustainable behaviors: curtailment, and sustainably-produced product choices.

7.2.2. Sustainable consumer segments

From the literature review (Chapter 2) we concluded that in many segmentation studies related to food, a sustainable, an unsustainable, and one or more intermediate segments can be identified. The same conclusion can be drawn from each of our studies. Although it might sound like a truism, it is an interesting finding for the following reasons. Before we started the research, it was not clear whether we would find segments differing mainly in the *level* of sustainability. Instead, we expected to find several *qualitatively* different segments valuing different aspects of sustainability, such as animal welfare or environmental aspects, because we found those types of segments in the literature (see Chapter 2). Alternatively, a possible outcome was to find several sustainability segments for different product categories (e.g. a segment focused on sustainable meat, and a segment focused on sustainable vegetables). Overall, this research shows that if several sustainability dimensions for several product categories are included in a segmentation analysis, the resulting segments differ mainly in level of sustainability motives or behaviors and do not show qualitative differences in the sustainability dimension that they value or the product category on which they are focused. We did find some nuances, though, mainly in the intermediate segment of sustainability. Although the level of sustainability stands out in forming the segments, the type of sustainability (Chapter 3) or the underlying lifestyle (Chapter 5) can differ within the same sustainability level.

Although we found a sustainable segment in each of our studies, it must be noticed that taste and price are the dominant food choice motives for all segments (Chapters 3, 4 and 6). From the literature it was already known that price and taste are the most important food choice motives to consumers (Insch & Jackson, 2014; Markovina et al., 2015; Onwezen & Bartels, 2011; Sautron et al., 2015), but we add the insight that this is even true for sustainable consumers. We did not find a segment that values sustainability above all other motives.

An additional interesting finding concerning sustainable consumer segments is the link with healthiness. We found that the sustainable conscious segment also scores high on their motivation to consume healthily (Chapter 4). Also, the intermediate segment (average consumers) scores quite high on the importance of healthiness. Apparently, a segment can be identified that highly values healthiness, but is not very interested in sustainability, and another segment that values both healthiness and sustainability. However, we did not identify a segment valuing sustainability but not healthiness. Thus, sustainability motivations seem to go hand in hand with health motivations but

the reverse is not necessarily true. This link between healthiness and sustainability in consumer motivations may be influenced by consumer perceptions, as we found that those in the sustainable segment perceived most synergy between healthiness and sustainability (Chapter 4). Those in the intermediate segment (average consumers) also perceived synergy to some extent. Consequently, an important question for future research would be whether consumers exist who attach importance to sustainability attributes per se, or is it always the perceived link with healthiness that makes consumers value sustainability?

Our findings underpin the importance of consumer segmentation in targeting policy measures and interventions. Segments differ in the type of sustainable behavior they perform (Chapter 3), in the relative importance of product attributes (Chapter 4), in their food choice motives (Chapters 3 and 4), in their perceptions (Chapters 4 and 5), in their beliefs (Chapters 5 and 6), in their norms (Chapters 3 and 5), in their openness to try new products (Chapter 5), etc. The behavioral and lifestyle differences across the segments suggest that they need different approaches. These differences can be used to develop tailored interventions adapted to the target group. In Chapter 6, we tested an intervention in which health and sustainability arguments were communicated and found that this intervention is only effective (to a limited extent) for sustainable conscious consumers. This result suggests that the other segments need other approaches (Chapter 6) (See also in Section 7.4).

7.2.3. The hierarchy of constructs

From the literature review (Chapter 2) as well as from our empirical studies (Chapters 3 to 6) we conclude that personal characteristics, lifestyles and behaviors are all useful in providing insights into sustainable consumer segments. In each of the hierarchical levels, differences between consumer segments related to sustainable food can be found.

Regarding personal characteristics, Chapter 6 shows that time orientation and values differ between segments. These variables are useful profiling variables to provide additional insights into lifestyle-based sustainable food segments, because these variables can be used in communication. Messages could steer consumers towards a future orientation or a biospheric mindset, for example, and can therewith help to stimulate sustainable choices. As expected based on the literature review (Chapter 2), sociodemographic characteristics did not differ much between segments, with the exception of gender. Gender is found to be of importance in curtailment behavior (Chapter 3) as well as in meat consumption (Chapter 5).

Our results show that lifestyle variables measured on the product-category level provide valuable segments. Lifestyle variables have been advocated in the literature as important segmentation bases and are widely used as such (Grunert, Brunsø, & Bisp, 1993; Van Raaij & Verhallen, 1994; Wedel & Kamakura, 2000). Especially when lifestyle variables are operationalized on the level of the domain of interest, they form a valuable link between general personality characteristics and behaviors. Lifestyle variables are more closely related to behavior than personal characteristics and help to understand *why* consumers behave like they do (in contrast to behavioral segments, which lack insights in the underlying motivations of behavior) (Dagevos, He, Zhang, van der Lans, & Zhai, 2011; Solomon, Bamossy, & Askegaard, 2002; Van Raaij & Verhallen, 1994; Weinstein, 1987). Our research underpins the lifestyle basis of segmentation, as we found that our lifestyle-based segments differ both in personal characteristics (time orientation and values) and behaviors (food intake) (Chapters 5 and 6). In addition, we found interesting links within lifestyle levels, that is between food choice motives, attribute importance and perceptions (Chapter 4). The sustainable conscious segment was found to value sustainability motives most, and also perceived sustainably produced products most often as healthy and sustainable.

On the behavioral level, we show the importance of discriminating between different types of sustainable consumers (Chapter 3). On the lifestyle level, we found segments that differ mainly quantitatively in their level of sustainability motives and other lifestyle aspects, whereas at the behavioral level we identified segments that differ both quantitatively and qualitatively. This adds to the literature in which behavioral segments mainly differ quantitatively (e.g. Bartels & van den Berg, 2011). In addition, our results show the link between lifestyle and behavior. In Chapter 3, for example, we found that the sustainable consumer segment also attach most importance to sustainability. In Chapter 5 we found that compulsive meat eaters have the highest meat intake and also the least favorable lifestyle in terms of meat curtailment.

7.2.4. The level of specificity of lifestyles and behaviors

From the literature it is well-known that it is important to measure behaviors and lifestyles on the same level of specificity in order to get useful insights into their relationship (Hustad & Pessemier, 1974; Kaiser, Wölfling, & Fuhrer, 1999; Van Raaij & Verhallen, 1994; Van Trijp & Fischer, 2011; Weigel & Newman, 1976). Because of the central position of product categories in enabling the shift towards sustainable diets (eating less meat and dairy, and more vegetables and fruits) the variables used in our studies have been operationalized on the product-category level. In the literature,

product categories are often studied in isolation (e.g. Bartels & van den Berg, 2011; Brunso, Verbeke, Olsen, & Jeppesen, 2009; Geeroms, Verbeke, & Kenhove, 2008; Hayley, Zinkiewicz, & Hardiman, 2015; Honkanen & Olsen, 2009; Johansen, Næs, & Hersleth, 2011; Latvala et al., 2012; Pieniak, Verbeke, Olsen, Hansen, & Brunso, 2010; Verbeke & Vackier, 2004), but studies including several product categories are limited (e.g. Sautron et al., 2015). We show that the product-category level is a useful level to research sustainable motivations and behaviors. In our results we find indications for differences at the product-category level in consumer motivations, perceptions, and intentions. Although these differences are small and are not reflected in consumer segments (Chapters 4 and 6), we are convinced that it is important to consider product-category differences, as the results show that the product category is of importance in the effect of communication on intentions (Chapter 6).

7.3. Suggestions for future research

Despite offering theoretical contributions, the research has some limitations, leading to new questions and suggestions for future research. Although in the previous section already some suggestions for future research have been given, five issues deserve special attention and will be discussed next: consumers as agents of change, the cognitive approach, methodological considerations, the search for synergies and spillovers, and long-term effects.

7.3.1. Consumers as agents of change

In this research, we focused on the consumers as agents of change regarding sustainable food consumption. Consumers determine what they purchase and consume, and when public bodies are aiming for shifting dietary patterns toward more sustainable diets, consumers are crucial in achieving this change. Indirectly, consumer behavior determines the sustainability of products and production systems through consumer demand (Grunert, 2011; Heller, Keoleian, & Willett, 2013; Van Trijp & Fischer, 2011). Although the role of consumers is important, we cannot expect too much of consumers (see, for example, Vittersø & Tangeland, 2015), for two reasons. First, not all consumers are motivated to consume sustainably, and it will be impossible to motivate all. Therefore, other pathways to stimulate the transition towards more sustainable diets should be considered (See Section 7.4. for examples). Second, consumer influence on some parts of the supply chain is limited. Therefore, other stakeholders should take responsibility as well. In changing production systems, for example, the role of producers and the

power of retailers should not be neglected. In addition, policy measures could stimulate the transition towards more sustainable production system e.g., through legislation or subsidies.

Concerning consumer motivations, consumers should not only be motivated but also be given the opportunity and the ability to consume sustainably (Rothschild, 1999). Availability of sustainable products, and adequate information and labelling, are important in providing opportunity and ability. Although consumers have an important role in the transition towards sustainable diets, other actors should not be neglected and they should take a proactive role in empowering consumers to make that shift.

7.3.2. The motivational approach

In the current research, we emphasized the importance of consumer motivations. Insights into consumer motivations are crucial in policy development aimed at shifting dietary patterns, but from the literature we know that other more habitual or affective determinants, such as habits and emotions, also play an important role in consumer food choices (Van 't Riet, Sijtsema, Dagevos, & de Bruin, 2011; Verplanken & Orbell, 2003). Especially when it concerns specific choice contexts, motivational aspects can play a subordinate role. Behavior is determined by the interaction between personal variables (e.g. motivation) and situational variables, and personal variables are not constant across situations (Van Raaij & Verhallen, 1994). Affective (emotions) or contextual factors (availability, social norms) might prevail. Therefore, this research should be interpreted on a general food-domain or product-category level, and is not context-specific.

7.3.3. Methodological limitations and considerations

The current research is exploratory in nature and should be interpreted as such. Although we are confident that this research has resulted in useful insights (see Sections 7.2. and 7.4.), future research is needed to replicate our findings and validate them in other countries, in different situations, and for other product categories. Methodological considerations concerning the operationalization of sustainable food, the identification of sustainable food segments, the hierarchy of constructs, and level of specificity that have been used will be discussed next, and several avenues for future research will be proposed.

A validated measurement tool to measure sustainability motivations or sustainable food behaviors is lacking. Therefore, we developed our own scales, based on the literature. A first challenge was to operationalize sustainable food consumption. Although in the literature consensus exists on the sustainability gains of a less animal-



based and more plant-based diet, the operationalization of sustainable product choices was harder because of contradictory opinions on desirability of organic production, local production, use of antibiotics, available space per animal, etc. These sustainable production aspects are sometimes conflicting. We based the selection of the items on the dominant opinion in the literature, but future research is needed to get better insights into what aspects should be prioritized in achieving sustainable diets. The measurement scale of attribute importance has been based on the validated food choice questionnaire with the addition of ethical motives (Steptoe, Pollard, & Wardle, 1995; Lindeman & Väänänen, 2000), but sustainability attributes are limited in this questionnaire and were therefore added. Because of limitations in the number of items, we only added healthiness, price and taste as additional attributes, next to sustainability. The imbalance between sustainability attributes and other attributes might have influenced the factor solution in which health, taste and price scored on one factor. By including more items, it is likely that more factors will be identified (Steptoe et al., 1995). In addition, we measured importance of organic and animal-friendly attributes in the same way as we measured it for health, but it might be that health is an underlying motivation for choosing products with organic or animal-friendly attributes. Qualitative research would be useful to understand the underlying motivations better. In Chapter 5, for example, insights in motivations to reduce meat consumption are unclear. Similarly, in Chapter 2, insights in motivations behind curtailment behavior and sustainable product choices would be useful. In short, the development of validated scales to measure sustainability motivations and sustainable behaviors is needed, although a recent start has been made in the literature (e.g. Balderjahn, Peyer, & Paulssen, 2013; Sautron et al., 2015).

The included variables in our studies were based on theory, but it is not always clear from theory how all the variables are related (especially on the lifestyle level). Future research should clarify these relationships, which might be helpful in the design of interventions. The development of consumer theory related to sustainable food would be a useful addition to the current literature. Although the hierarchy of constructs turned out to be a valuable framework and was helpful in structuring the research, it became clear that a unifying theory on sustainable food consumption is lacking. A whole range of consumer behavior theories provide relevant methodological and theoretical insights for researching sustainable consumer segments (See Chapter 1), but none of the available theories was sufficient on its own. Most existing theories are too general to explain sustainable behavior, for which specific variables (e.g. ethical considerations) should be included, or only encompass a small part of the relevant variables. Our research has shown the empirical relevance of distinguishing consumer

segments based on food-related lifestyles and behaviors and has provided some valuable insight that can be used as a starting point for theory building in this domain.

We operationalized our segmentation variables mainly on the level of the product category. This is a useful level regarding our research aims (the level on which we would like dietary shifts to occur is the product-category level), and our research confirmed the importance of taking product-category differences into account (Chapters 4 and 6), although the differences between product categories were small. Based on our findings, product-category differences seem particularly important in understanding curtailment behavior, but are less useful in the context of sustainable product choices, because these choices all load on one factor (Chapter 6). In the future, product-category differences should be researched in more depth, because of the high practical relevance of product-category differences in shifting diets. In addition, it should be noted that within product categories important differences can exist in the sustainability of the products. It would be interesting to research whether consumers are more willing to shift their consumption towards more sustainable options within a product category than between product categories.

7.3.4. In search of synergies

In Chapters 4 and 6 we focused on synergies between healthiness and sustainability. Synergy is important, because of the urgency to shift contemporary diets towards more healthy and sustainable consumption levels, but it has its limitations as well. First, synergies do not always exist. In the case of fish, for example, there is a trade-off between healthiness and sustainability (Health Council of the Netherlands, 2011). Second, some consumers do value neither sustainability nor health, and if they do, it will not necessarily result in healthy and sustainable consumption because of barriers such as other dominating motives. Third, in some cases, such as for organic products, the link with healthiness is not (yet) scientifically proven. Therefore, future research could focus on synergies with other product attributes such as price and taste, which are the most important food choice motives for most consumers.

7.3.5. Spillover and long-term effects

Although the search for synergies is a promising route to take into consideration when stimulating sustainable diets, in the light of spillover and long-term effects it could have adverse effects. Spillover entails the influence from one behavior to subsequent behaviors and can be either positive (one sustainable behavior leading to subsequent sustainable behaviors) or negative (one sustainable behavior leading to a subsequent

unsustainable choice) (Thøgersen & Crompton, 2009). Positive spillover can occur through the development of a sustainable identity or attainment of certain skills and knowledge (e.g. developing vegetarian cooking skills). Negative spillover can occur due to the licensing effect (feeling entitled to make an unsustainable choice after a sustainable contribution) (Tiefenbeck, Staake, Roth, & Sachs, 2013; Thøgersen & Crompton, 2009). Insights into the occurrence of spillover effects and underlying mechanisms, in each of the different consumer segments, is an important avenue for future research as the entire food pattern should become more sustainable. The search for synergies might be important in motivating sustainable food choices in the short run, but in the long run it might pay off to focus on sustainability in motivating, convincing and enabling to change their entire food pattern towards a more sustainable diet, because it may stimulate positive spillovers.

In addition, insights into long-term effects of how and when consumers shift from one segment to another is an important avenue for future research. Do consumers switch from one segment to another in the first place? And if so, when and why does this occur? Does a transition to a more sustainable segment occur progressively or is it acute, for example, when a life-changing event occurs (e.g. when people get a child, start living together, encounter a medical problem or retire)? Can spillovers help to effectuate such transition, for example, when consumers start with sustainable behaviors in one product category, and other categories follow progressively; or when consumers purchase sustainably produced products and then start to curtail because it fits their “green” identity? Such insights help prioritize when and how efforts could be taken most efficiently to stimulate consumers towards more sustainable diets.

7.4. Practical relevance

The current research has several practical implications for researchers as well as for those involved in stimulating sustainable food consumption. The level of specificity that has been chosen in this research the product-category level makes the findings most relevant for those operating on the level of the entire diet (e.g. policy makers, nutrition institutes, or supermarkets), or on the level of one of the product categories included in the research. Especially for those involved in communicating dietary guidelines, the findings are highly relevant. Seven key implications, relevant in stimulating sustainable diets and communicating dietary guidelines, have been formulated and are discussed below. These seven key implications are related to the seven main findings as discussed under 7.1.

Beware of unidimensionality of sustainability.

We found that all sustainability dimensions load on a single sustainability factor, which exists on each of the levels of motives, product-category attribute importance, perceptions, intentions and behaviors. This implies that it is useless to research sustainability dimensions separately and suggests that the promotion of organic products, fair trade products, animal welfare products etc. can be generalized. It also implies that the development of one overall sustainability label can be helpful for consumers. In addition, it shows that studies conducted on a specific dimension may be generalized to sustainability in general and can therefore provide useful insights for other sustainability dimensions as well. Concerning dietary guidelines, this implies that communicating in terms of sustainability benefits in general, or in terms of one sustainability benefit only, may be sufficient. For example, it is unlikely that combining environmental with animal welfare benefits will increase communication effectiveness.

Distinguish curtailment and sustainable product choices.

Another important implication comes from the distinction between curtailment and sustainable product choices. This research shows that consumers differ regarding the two types of sustainable food behaviors they employ. Therefore, in stimulating either sustainable product choices or curtailment it is important to target those that are open to the targeted type of behavior, and to exploit variables that influence the relevant behavior. Our findings show that curtailment and sustainable product choices are predicted by different variables. Overall, in stimulating sustainable food consumption, both strategies should be targeted, because they are likely to motivate different people.

Don't neglect other food choice motives.

It is important to realize that taste and price were the dominant motives in all consumer segments, also among sustainable consumers. Therefore, sustainable choices are unlikely to be made if they are not evaluated as satisfactory on price and taste. This implies that synergies should be found between sustainability and price and/or taste. The availability of cheap and tasty meat replacers could be one example, but also seasonal fruits and vegetables are often more sustainable, have more taste and are cheaper compared to those imported or cultivated in greenhouses. It is important that such synergies between sustainability and price and taste are perceived as such by consumers, and therefore communication is important to make consumers aware of these synergies.



Make use of the link between health and sustainability: search for synergies.

An additional implication follows from the link between health and sustainability. The LOHAS-segment (lifestyles of health and sustainability) is a well-known concept among marketers (e.g. French & Rogers, 2006), but scientific literature on the LOHAS segment is limited. The current research found a segment (the sustainable conscious consumers) that can be labelled as such, as consumers in this segment highly value both sustainability and healthiness. We show that this segment perceives synergies between healthiness and sustainability in sustainably produced food products which can be used in the marketing of these products. In addition, we show that this segment is characterized by a future time orientation, which could also be employed in marketing efforts.

The synergy between health and sustainability can be used to stimulate sustainable consumption in the sustainable conscious segment and to a lesser extent in the average consumer segment (Chapter 4). The use of synergies seems particularly useful in stimulating sustainably produced products. For (meat) curtailment, it seems that consumers do not so much perceive the link with healthiness yet (Chapter 5). Therefore, communicating health and sustainability benefits of curtailment is important, before synergy can be effectively used in changing behaviors.

Identify lifestyle-based sustainable food segments, and target interventions to the identified segments.

The identification of consumer segments related to sustainable food lifestyles is important, as we found that in communicating the dietary guideline, the effectiveness differed between segments. Only sustainable conscious consumers seemed responsive to health and sustainability arguments in terms of their dietary intentions. For the other segments, there was no effect on intentions, implying that other strategies to make these segments consume more sustainably are needed. Synergies with other motives, such as price and taste, may be a useful strategy, but additional non-motivational pathways towards sustainable consumption should be considered as well, especially for unsustainable consumers. Possible pathways could be legislation (e.g. minimal animal welfare standards), sustainability by stealth (e.g. hybrid meats) (De Bakker & Dagevos, 2012), or nudges (e.g. Campbell-Arvai, Arvai, & Kalof, 2014; Demarque, Charalambides, Hilton, & Waroquier, 2015).

In addition, we found that lifestyle segments may show similar behavior, but because of their lifestyle differences might probably need different interventions to change their behavior. For example, Chapter 5 found unconscious and potential

flexitarians with a similar level of meat intake, but potential flexitarians are much more open to try new products and therefore can be targeted with new substitutes more effectively than unconscious flexitarians.

Consider all levels in the hierarchy of constructs in the profiling of segments.

Include profiling variables on personal characteristics, lifestyles and behaviors in segmentation studies, because all levels provide useful insights into the segments (Chapters 2, 3, 4, 5, 6). These insights can be used in developing effective strategies tailored to specific segments.

Operationalize lifestyles and behaviors on the product-category level.

The effectiveness of communicating health and sustainability benefits of the dietary guideline is limited to meat consumption (Chapter 6). This underpins the importance of considering product-category differences. Product-category differences seem to exist in attribute importance, perceptions and intentions, but are not reflected in consumer segments. Therefore, if practitioners would like to change behavior in a certain product category (e.g. reducing meat consumption), it is advisable to segment consumers based on their lifestyle variables operationalized for that specific product category (e.g. meat segments).

7.5. Conclusions

The research presented in this thesis contributes to a better understanding of sustainable food consumption. Two central questions have been researched. The first question concerned the identification of consumer segments in the domain of sustainable food. We identified consumer segments regarding sustainable food lifestyles (Chapters 4, 5 and 6) and sustainable food behaviors (Chapter 3), and found sustainable consumer segments on both levels. It is important to note, though, that even for sustainable consumers, price and taste are the most important food choice motives (Chapter 3 and 4). The lifestyle-based sustainable segment (sustainable conscious consumers) we found in Chapter 3 can even be called a LOHAS-segment, in which not only sustainability but also health is highly valued. In addition, we learned that lifestyle-based sustainability segments reflect the level of importance that consumers attach to sustainability, but they do not reflect differences in importance of sustainability dimensions or product categories (Chapter 4). Finally, on the behavioral level, we found that consumer segments not only differ in the level of sustainable food behavior, but also in the type



of sustainable behavior they employ (Chapter 3). The second question concerned the relation of the identified segments with personal, lifestyle and behavioral variables related to sustainability and food. We found that lifestyle-based segments were related to personal characteristics, other lifestyle characteristics as well as to behavior (Chapters 2, 4, 5 and 6). Worth noting is the specific link that we found between segments based on product-category attribute importance, and health motives and perceptions (Chapter 4). In addition, we found that behavior-based segments were linked to a range of lifestyle variables and gender (Chapter 3). Overall, the findings show the practicality of the hierarchy of constructs in identifying and profiling consumer segments in the domain of sustainable food. This research adds to the literature by showing the importance of considering the product category level (Chapters 4 and 6) as well as the type of sustainable behavior that consumers perform (Chapter 3). The different dimensions of sustainability do not seem relevant, as all dimensions lump together into one underlying factor (Chapter 3, 4 and 6). Lifestyle variables appear to be useful segmentation bases as they are closely linked to behavior and provide insights into underlying cognitions.

To conclude, this research on sustainable consumer segments is exploratory in nature, provides theoretical as well as practical contributions, and has opened up new research directions for exploring food-related consumer segments and ways to shift consumer diets towards more sustainable levels. The findings of this thesis offer a good starting point to examine further how consumer segments can best be identified in the domain of sustainable food consumption and, in particular, which pathways should be taken to stimulate sustainable food consumption in these segments. In this way, this thesis contributes to more sustainable food consumption.



References



- Abeliotis, K., Koniari, C., & Sardianou, E. (2010). The profile of the green consumer in Greece. *International Journal of Consumer Studies*, 34, 153-160.
- Aertsens, J., Verbeke, W., Mondelaers, K., & van Huylenbroeck, G. (2009). Personal determinants of organic food consumption: A review. *British Food Journal*, 111(10), 1140-1167.
- Ajzen, I. (1991). The theory of planned behaviour. *Organizational Behaviour and Human Decision Processes*, 50(2), 179-211.
- Alarcon, B., & Gerritsen, E. (2014). *On our plate today: healthy, sustainable food choices*. LiveWell for LIFE/WWF.
- Allen, M. W., & Baines, S. (2002). Manipulating the symbolic meaning of meat to encourage greater acceptance of fruits and vegetables and less proclivity for red and white meat. *Appetite*, 38(2), 118-130.
- Andersen, L. M., & Lund, T. B. (2014). Digging deeper: How do different types of organic consumers influence the increasing organic market share? *British Food Journal*, 116(1), 16-29.
- Anderson, T. W., & Golden, L. L. (1984). Lifestyle and psychographics: A critical review and recommendation. *Advances in Consumer Research*, 11, 405-411.
- Annunziata, A., Ianuario, S., & Pascale, P. (2011). Consumers' attitudes toward labelling of ethical products: The case of organic and fair trade products. *Journal of Food Products Marketing*, 17(5), 518-535.
- Annunziata, A., & Scarpato, D. (2014). Factors affecting consumer attitudes towards food products with sustainable attributes. *Agricultural Economics (Czech Republic)*, 60(8), 353-363.
- Antonides, G., & Nyhus, E. K. (in preparation). *Time preference and household financial capability*.
- Antonides, G., & van Raaij, W. F. (1998). *Consumer behaviour: A European perspective*. Chichester: Wiley.
- Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behaviour: A meta-analytic review. *British Journal of Social Psychology*, 40(4), 471-499.
- Arvola, A., Vassallo, M., Dean, M., Lampila, P., Saba, A., Lähteenmäki, L., & Shepherd, R. (2008). Predicting intentions to purchase organic food: The role of affective and moral attitudes in the Theory of Planned Behaviour. *Appetite*, 50(2-3), 443-454.
- Aschemann-Witzel, J. (2015). Consumer perception and trends about health and sustainability: trade-offs and synergies of two pivotal issues. *Current Opinion in Food Science*, 3, 6-10.
- Aschemann-Witzel, J., & Niebuhr Aagaard, E. M. (2014). Elaborating on the attitude-behaviour gap regarding organic products: Young Danish consumers and in-store food choice. *International Journal of Consumer Studies*, 38(5), 550-558.

References

- Askegaard, S., & Madsen, T. K. (1998). The local and the global: exploring traits of homogeneity and heterogeneity in European food cultures. *International Business Review*, 7(6), 549-568.
- Assadourian, E. (2010). The rise and fall of consumer cultures. In L. Starke & L. Mastny (Eds.), *State of the world 2010: Transforming cultures from consumerism to sustainability* (pp. 3-20). London: The Worldwatch Institute.
- Auestad, N., & Fulgoni, V. L. (2015). What current literature tells us about sustainable diets: Emerging research linking dietary patterns, environmental sustainability, and economics. *Advances in Nutrition: An International Review Journal*, 6(1), 19-36.
- Baker, S., Thompson, K. E., & Palmer-Barnes, D. (2002). Crisis in the meat industry: a values-based approach to communications strategy. *Journal of Marketing Communications*, 8(1), 19-30.
- Balderjahn, I., Peyer, M., & Paulssen, M. (2013). Consciousness for fair consumption: Conceptualization, scale development and empirical validation. *International Journal of Consumer Studies*, 37(5), 546-555.
- Bamberg, S., & Möser, G. (2007). Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour. *Journal of Environmental Psychology*, 27(1), 14-25.
- Bamberg, S., Hunecke, M., & Blöbaum, A. (2007). Social context, personal norms and the use of public transportation: Two field studies. *Journal of Environmental Psychology*, 27, 190-203.
- Barilla Center for Food and Nutrition (2010). *Double pyramid: Healthy food for people, sustainable food for the planet*. Parma, Italy: Barilla Center for Food and Nutrition.
- Baroni, L., Cenci, L., Tettamanti, M., & Berati, M. (2007). Evaluating the environmental impact of various dietary patterns combined with different food production systems. *European Journal of Clinical Nutrition*, 61, 279-286.
- Barr, S. & Gilg, A. (2006). Sustainable lifestyles: Framing environmental action in and around the home. *Geoforum*, 37, 906-920.
- Barr, S., Gilg, A. W., & Ford, N. (2005). The household energy gap: Examining the divide between habitual- and purchase-related conservation behaviors. *Energy Policy*, 33, 1425-1444.
- Bartels, J., Onwezen, M. C., Ronteltap, A., Fischer, A. R. H., Kole, A. P. W., van Veggel, R. J. F. W., & Meeusen, M. J. G. (2009). *Eten van waarde: peiling consument en voedsel*. Den Haag: LEI Wageningen UR.
- Bartels, J., & Reinders, M. J. (2011). Consumer innovativeness and its correlates: A propositional inventory for future research. *Journal of Business Research*, 64(6), 601-609.

- Bartels, J., & van den Berg, I. (2011). Fresh fruit and vegetables and the added value of antioxidants: Attitudes of non-, light, and heavy organic food users. *British Food Journal*, 113(11), 1339-1352.
- Baumgartner, H., & Homburg, C. (1996). Applications of structural equation modeling in marketing and consumer research: A review. *International Journal of Research in Marketing*, 13(2), 139-161.
- Beardsworth, A., & Keil, T. (1992). The vegetarian option. Varieties, conversions, motives and careers. *The Sociological Review*, 40(2), 253–293.
- Beardsworth, A. D., & Keil, T. (1991). Vegetarianism, veganism and meat avoidance. Recent trends and findings. *British Food Journal*, 93(4), 19–24.
- Bell, R., & Marshall, D. W. (2003). The construct of food involvement in behavioral research: scale development and validation. *Appetite*, 40, 235-244.
- Bellows, A. C., Alcaraz V. G., & Hallman, W. K. (2010). Gender and food, a study of attitudes in the USA towards organic, local, U.S. grown, and GM-free foods. *Appetite*, 55(3), 540-550.
- Bernabéu, R., Brugarolas, M., Martínez-Carrasco, L., & Díaz, M. (2008). Wine origin and organic elaboration, differentiating strategies in traditional producing countries. *British Food Journal*, 110(2), 174-188.
- Bernués, A., Olaizola, A., & Corcoran, K. (2003a). Extrinsic attributes of red meat as indicators of quality in Europe: An application for market segmentation. *Food Quality and Preference*, 14(4), 265-276.
- Bernués, A., Olaizola, A., & Corcoran, K. (2003b). Labelling information demanded by European consumers and relationships with purchasing motives, quality and safety of meat. *Meat Science*, 65(3), 1095-1106.
- Bernués, A., Ripoll, G., & Panea, B. (2012). Consumer segmentation based on convenience orientation and attitudes towards quality attributes of lamb meat. *Food Quality and Preference*, 26(2), 211-220.
- Bezençon, V., & Blili, S. (2011). Segmenting the market through the determinants of involvement: The case of fair trade. *Psychology and Marketing*, 28(7), 682-708.
- Bond, C. A., Thilmany, D., & Keeling Bond, J. (2008). Understanding consumer interest in product and process-based attributes for fresh produce. *Agribusiness*, 24(2), 231-252.
- Bornett, H. L. I., Guy, J. H., & Cain, P. J. (2003). Impact of animal welfare on costs and viability of pig production in the UK. *Journal of Agricultural and Environmental Ethics*, 16, 163-186.
- Boulanger, P. M. (2010). Three strategies for sustainable consumption. *Sapiens*, 3(2), 1-10.
- Brinzan, O., Tigan, E., & Radu, D. (2012). Food consumption and sustainability. *Journal of Environmental Protection and Ecology*, 13(1), 253-257.

References

- Brunso, K., & Grunert, K. G. (1995). Development and testing of a cross-culturally valid instrument: Food-related lifestyle. *Advances in Consumer Research*, 22, 475-480.
- Brunso, K., Scholderer, J., & Grunert, K. G. (2004). Closing the gap between values and behavior - a means-end theory of lifestyle. *Journal of Business Research*, 57(6), 665-670.
- Brunso, K., Verbeke, W., Olsen, S. O., & Jeppesen, L. F. (2009). Motives, barriers and quality evaluation in fish consumption situations: Exploring and comparing heavy and light users in Spain and Belgium. *British Food Journal*, 111(7), 699-716.
- Burlingame, B. A., & Dernini, S. (2012). Sustainable diets and biodiversity: Directions and solutions for policy, research and action. In *International scientific symposium on biodiversity and sustainable diets united against hunger 2010* (pp. 28-53). Rome, Italy: FAO.
- Caballero, B. (2007). The global epidemic of obesity: An overview. *Epidemiologic Reviews*, 29(1), 1-5.
- Cameron, L. D., Brown, P. M., & Chapman, J. G. (1998). Social value orientations and decisions to take proenvironmental action. *Journal of Applied Social Psychology*, 28(8), 675-697.
- Campbell-Arvai, V., Arvai, J., & Kalof, L. (2014). Motivating sustainable food choices: The role of nudges, value orientation, and information provision. *Environment and Behavior*, 46(4), 453-475.
- Carlsson-Kanyama, A., & González, A. D. (2009). Potential contributions of food consumption patterns to climate change. *The American Journal of Clinical Nutrition*, 89(5), 1704S-1709S.
- Cerjak, M., Karolyi, D., & Mesic, Z. (2011). Consumers' attitudes towards farm animal welfare and their influence on meat consumption. *Agriculturae Conspectus Scientificus*, 76, 283-286.
- Chrysosoidis, G. M., & Krystallis, A. (2005). Organic consumers' personal values research: Testing and validating the list of values (LOV) scale and implementing a value-based segmentation task. *Food Quality and Preference*, 16(7), 585-599.
- Coelho, S. L. (2015). Fair trade consumers in Portugal: Values and lifestyles. *International Journal of Consumer Studies*, 39(5), 437-444.
- Conner, M., & Armitage, C. J. (2006). Social psychological models of food choice. In R. Shepherd & M. Raats (Eds.), *The psychology of food choice* (pp 41-58). Wallingford: CABI.

- Conway, J. M., & Huffcutt, A. I. (2003). A review and evaluation of exploratory factor analysis practices in organizational research. *Organizational Research Methods*, 6, 147-168.
- Costa, A. D. A., Dekker, M., & Jongen, W. M. F. (2004). An overview of means-end theory: potential application in consumer-oriented food product design. *Trends in Food Science & Technology*, 15(7), 403-415.
- Dagevos, H. (2005). Consumers as four-faced creatures. Looking at food consumption from the perspective of contemporary consumers. *Appetite*, 45(1), 32-39.
- Dagevos, H. (2014). Flexibility in the frequency of meat consumption: Empirical evidence from The Netherlands. *EuroChoices*, 13(2), 40-45.
- Dagevos, H., & de Bakker, E. (2015). Consumers as agents of change in transforming meat consumption patterns. In K. Soeters (Ed.), *Meat, the future: How cutting meat consumption can feed billions more* (pp. 123-140). Amsterdam: Nicolaas G. Pierson Foundation.
- Dagevos, H., He, Y., Zhang, X., van der Lans, I., & Zhai, F. (2011). Relationships among healthy lifestyle beliefs and body mass index in urban China. *International Journal of Consumer Studies*, 35(1), 10-16.
- Dagevos, H., & Voordouw, J. (2013). Sustainability and meat consumption: Is reduction realistic? *Sustainability: Science, Practice, and Policy*, 9(2), 60-69.
- Davies, S. (2001). Food choice in Europe - The consumer perspective. In L. J. Frewer, E. Risvik, & H. Schifferstein (Eds.), *Food, people and society* (pp. 365-400). Berlin: Springer.
- Davies, S. (2011). Making sustainable choices easier. *Nutrition Bulletin*, 36(4), 454-459.
- De Backer, C. J. S., & Hudders, L. (2015). Meat morals: Relationship between meat consumption consumer attitudes towards human and animal welfare and moral behavior. *Meat Science*, 99, 68-74.
- De Bakker, E., & Dagevos, H. (2012). Reducing meat consumption in today's consumer society: Questioning the citizen-consumer gap. *Journal of Agricultural and Environmental Ethics*, 25(6), 877-894.
- De Barcellos, M. D., Krystallis, A., de Melo Saab, M. S., Kügler, J. O., & Grunert, K. G. (2011). Investigating the gap between citizens' sustainability attitudes and food purchasing behaviour: empirical evidence from Brazilian pork consumers. *International Journal of Consumer Studies*, 35, 391-402.
- De Boer, J., Hoogland, C. T., & Boersema, J. J. (2007). Towards more sustainable food choices: Value priorities and motivational orientations. *Food Quality and Preference*, 18(7), 985-996.

References

- De Boer, J., Schösler, H., & Aiking, H. (2014). “Meatless days” or “less but better”? Exploring strategies to adapt Western meat consumption to health and sustainability challenges. *Appetite*, 76, 120-128.
- De Boer, J., Schösler, H., & Boersema, J. J. (2013). Climate change and meat eating: An inconvenient couple? *Journal of Environmental Psychology*, 33, 1-8.
- De Boer, J., Schösler, H., & Boersema, J. J. (2013). Motivational differences in food orientation and the choice of snacks made from lentils, locusts, seaweed or “hybrid” meat. *Food Quality and Preference*, 28(1), 32-35.
- De Groot, J. I. M., & Steg, L. (2008). Value orientations to explain beliefs related to environmental significant behavior: how to measure egoistic, altruistic, and biospheric value orientations. *Environment and Behavior*, 40(3), 330-354.
- De Groot, J. I. M. D., & Steg, L. (2009). Morality and prosocial behaviour: The role of awareness, responsibility, and norms in the norm activation model. *Journal of Social Psychology*, 149(4), 425-449.
- De Jonge, J., van der Lans, I. A., & van Trijp, H. C. M. (2015). Different shades of grey: Compromise products to encourage animal friendly consumption. *Food Quality and Preference*, 45, 87-99.
- De Jonge, J., & van Trijp, H. (2013). Meeting heterogeneity in consumer demand for animal welfare: A reflection on existing knowledge and implications for the meat sector. *Journal of Agricultural and Environmental Ethics*, 26(3), 629-661.
- Deliza, R., Rosenthal, A., Hedderley, D., MacFie, H. J. H. & Frewer, L. J. (1999). The importance of brand, product information and manufacturing process in the development of novel environmentally friendly vegetable oils. *Journal of International Food and Agribusiness Marketing*, 10, 67-77.
- Demarque, C., Charalambides, L., Hilton, D. J., & Waroquier, L. (2015). Nudging sustainable consumption: The use of descriptive norms to promote a minority behavior in a realistic online shopping environment. *Journal of Environmental Psychology*, 43, 166-174.
- Diamantopoulos, A., Schlegelmilch, B. B., Sinkovics, R. R., & Bohlen, G. M. (2003). Can socio-demographics still play a role in profiling green consumers? A review of the evidence and an empirical investigation. *Journal of Business Research*, 56, 465-480.
- Dolan, P. (2002). The sustainability of ‘sustainable consumption’. *Journal of Macromarketing*, 22(2), 170-181.
- Dolnicar, S., & Grün, B. (2009). Environmentally friendly behavior: Can heterogeneity among individuals and contexts/environments be harvested for improved sustainable management? *Environment and Behavior*, 41(5), 693-714.

- Dowd, K., & Burke, K. J. (2013). The influence of ethical values and food choice motivations on intentions to purchase sustainably sourced foods. *Appetite*, *69*, 137-144.
- D'Souza, C., Taghian, M. & Lamb, P. (2006). An empirical study on the influence of environmental labels on consumers. *Corporate Communications*, *11*, 162-173.
- Eertmans, A., Victoir, A., Vansant, G., & van den Bergh, O. (2005). Food-related personality traits, food choice motives and food intake: Mediator and moderator relationships. *Food Quality and Preference*, *16*(8), 714-726.
- Evans, L., Maio, G. R., Corner, A., Hodgetts, C. J., Ahmed, S., & Hahn, U. (2013). Self-interest and pro-environmental behaviour. *Nature Climate Change*, *3*(2), 122-125.
- Eyal, T., Liberman, N., & Trope, Y. (2008). Judging near and distant virtue and vice. *Journal of Experimental Social Psychology*, *44*(4), 1204-1209.
- Feiler, D. C., Tost, L. P., & Grant, A. M. (2012). Mixed reasons, missed givings: The costs of blending egoistic and altruistic reasons in donation requests. *Journal of Experimental Social Psychology*, *48*(6), 1322-1328.
- Fernqvist, F., & Ekelund, L. (2014). Credence and the effect on consumer liking of food – A review. *Food Quality and Preference*, *32*, 340-353.
- Field, A. (2005). *Discovering statistics using SPSS* (2nd ed.). London: Sage Publications Ltd.
- Fischer, R., & Milfont, T. L. (2010). Standardization in psychological research. *International Journal of Psychological Research*, *3*(1), 88-96.
- Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.
- FLO (2011). *About Fairtrade*. Retrieved April 29, 2011, from http://www.fairtrade.net/what_is_fairtrade.html.
- Font-i-Furnols, M., & Guerrero, L. (2014). Consumer preference, behavior and perception about meat and meat products: An overview. *Meat Science*, *98*(3), 361-371.
- Food and Agriculture Organisation of the United Nations [FAO] (2009). *How to Feed the World in 2050*. Rome: High-Level Expert Forum.
- Ford, G. T., Smith, D. B., & Swasy, J. L. (1988). An empirical test of the search, experience and credence attributes framework. *Advances in Consumer Research*, *15*, 239-244.
- Foresight (2011). *The future of food and farming: Challenges and choices for global sustainability*. London: The Government Office for Science.
- Fotopoulos, C., Krystallis, A., Vassallo, M., & Pagiaslis, A. (2009). Food Choice Questionnaire: Suggestions for the development of an enhanced general food motivation model. *Appetite*, *52*, 199-208.

References

- Fox, N., & Ward, K. (2008). Health, ethics and environment: A qualitative study of vegetarian motivations. *Appetite, 50*(2-3), 422-429.
- Fraj, E., & Martinez, E. (2006). Environmental values and lifestyles as determining factors of ecological consumer behaviour: An empirical analysis. *Journal of Consumer Marketing, 23*, 133-144.
- French, S., & Rogers, G. (2006). *Marketplace Opportunities: Growth & Demographic Opportunities*. The Natural Marketing Institute (NMI).
- Fuchs, D. A., & Lorek, S. (2005). Sustainable consumption governance: A history of promises and failures. *Journal of Consumer Policy, 28*(3), 261-288.
- Furst, T., Connors, M., Bisogni, C. A., Sobal, J., & Falk, L. W. (1996). Food choice: A conceptual model of the process. *Appetite, 26*(3), 247-265.
- Gad Mohsen, M., & Dacko, S. (2013). An extension of the benefit segmentation base for the consumption of organic foods: A time perspective. *Journal of Marketing Management, 29*(15-16), 1701-1728.
- Gärling, T. (1999). Value priorities, social value orientations and cooperation in social dilemmas. *British Journal of Social Psychology, 38*(4), 397-408.
- Gärling, T., Fujii, S., Gärling, A., & Jakobsson, C. (2003). Moderating effects of social value orientation on determinants of proenvironmental behavior intention. *Journal of Environmental Psychology, 23*(1), 1-9.
- Garnett, T. (2011). Where are the best opportunities for reducing greenhouse gas emissions in the food system (including the food chain)? *Food Policy, 36*, S23-S32.
- Garnett, T. (2013). Food sustainability: problems, perspectives and solutions. *Proceedings of the Nutrition Society, 72*(1), 29-39.
- Geeroms, N., Verbeke, W., & Kenhove, P. V. (2008). Health advertising to promote fruit and vegetable intake: Application of health-related motive segmentation. *Food Quality and Preference, 19*(5), 481-497.
- Gil, J. M., Gracia, A., & Sánchez, M. (2000). Market segmentation and willingness to pay for organic products in Spain. *International Food and Agribusiness Management Review, 3*, 207-226.
- Glanz, K., Basil, M., Maibach, E., Goldberg, J., & Snyder, D. (1998). Why Americans eat what they do: Taste, nutrition, cost, convenience, and weight control concerns as influences on food consumption. *Journal of the American Dietetic Association, 98*(10), 1118-1126.
- Goldsmith, R. E., Freiden, J. B., & Eastman, J. K. (1995). The generality/specificity issue in consumer innovativeness research. *Technovation, 15*(10), 601-612.
- Gorton, M., & Barjolle, D. (2013). Theories of food choice. In D. Barjolle, M. Gorton, J. M. Đorđević, & Ž. Stojanović (Eds.), *Food Consumer Science: Theories,*

- Methods and Application to the Western Balkans* (pp. 15-26). Dordrecht, NL: Springer Science & Business Media.
- Graça, J., Calheiros, M. M., & Oliveira, A. (2015). Attached to meat? (Un)Willingness and intentions to adopt a more plant-based diet. *Appetite*, *95*, 113-125.
- Graça, J., Oliveira, A., & Calheiros, M. M. (2015). Meat, beyond the plate. Data-driven hypotheses for understanding consumer willingness to adopt a more plant-based diet. *Appetite*, *90*, 80-90.
- Green, P. E., Carmona, F. J., & Wachspress, D. P. (1976). Consumer segmentation via latent class analysis. *The Journal of Consumer Research*, *3*, 170-174.
- Griskevicius, V., Tyler, J. M., & van den Bergh, B. (2010). Going green to be seen: Status, reputation, and conspicuous conservation. *Journal of Personality and Social Psychology*, *98*(3), 392-404.
- Grunert, K. G. (1993). Towards a concept of food-related life style. *Appetite*, *21*(2), 151-155.
- Grunert, K. G. (1995). Food quality: A means-end perspective. *Food Quality and Preference*, *6*(3), 171-176.
- Grunert, K. G. (2005). Food quality and safety: consumer perception and demand. *European Review of Agricultural Economics*, *32*(3), 369-391.
- Grunert, K. G. (2006). Future trends and consumer lifestyles with regard to meat consumption. *Meat Science*, *74*(1), 149-160.
- Grunert, K. G. (2011). Sustainability in the food sector: A consumer behaviour perspective. *International Journal on Food System Dynamics*, *2*(3), 207-218.
- Grunert, K. G., Brunso, K., & Bisp, S. (1993). *Food-related life style: Development of a cross-culturally valid instrument for market surveillance*. Working Paper No. 12, Århus, Denmark: MAPP.
- Grunert, K. G., Brunso, K., & Bisp, S. (1997). Food-related life style: Development of a cross-culturally valid instrument for market surveillance. In L. Kahle & C. Chiagouris (Eds.), *Values, lifestyles, and psychographics* (pp. 337-354). Hillsdale, NJ: Erlbaum.
- Grunert, K. G., Brunso, K., Bredahl, L. & Bech, A. C. (2001). Food-related lifestyle: a segmentation approach to European food consumers. In L. J. Frewer, E. Risvik & H. Schifferstein (Eds.), *Food, People and Society: A European Perspective of Consumers' Food Choices* (pp. 211-230). Berlin: Springer.
- Grunert, K. G., Hieke, S., & Wills, J. (2014). Sustainability labels on food products: Consumer motivation, understanding and use. *Food Policy*, *44*, 177-189.
- Grunert, S. C., & Juhl, H. J. (1995). Values, environmental attitudes, and buying of organic foods. *Journal of Economic Psychology*, *16*, 39-62.
- Gupta, S., & Ogden, D. T. (2009). To buy or not to buy? A social dilemma perspective on green buying. *Journal of Consumer Marketing*, *26*(6), 378-393.

References

- Gutman, J. (1982). A means-end chain model based on consumer categorization processes. *The Journal of Marketing*, 60-72.
- Gwozdz, W., Netter, S., Bjartmarz, T., & Reisch, L. A. (2013). *Survey Results on Fashion Consumption and Sustainability among Young Swedes*. Borås: Mistra Future Fashion.
- Haack, S. A., & Byker, C. J. (2014). Recent population adherence to and knowledge of United States federal nutrition guides, 1992-2013: A systematic review. *Nutrition Reviews*, 72(10), 613-626.
- Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2006). *Multivariate data analysis*. Upper Saddle River, NJ: Pearson Prentice Hall.
- Haley, R. I. (1968). Benefit segmentation: A decision-oriented research tool. *Journal of Marketing*, 32(3), 30-35.
- Hallström, E., Carlsson-Kanyama, A., & Börjesson, P. (2015). Environmental impact of dietary change: A systematic review. *Journal of Cleaner Production*, 91, 1-11.
- Hallström, E., Rööf, E., & Börjesson, P. (2014). Sustainable meat consumption: A quantitative analysis of nutritional intake, greenhouse gas emissions and land use from a Swedish perspective. *Food Policy*, 47, 81-90.
- Hammond, G. P. (2006). 'People, planet and prosperity': The determinants of humanity's environmental footprint. *Natural Resources Forum*, 30, 27-36.
- Hansen, J., Holm, L., Frewer, L., Robinson, P., & Sandøe, P. (2003). Beyond the knowledge deficit: recent research into lay and expert attitudes to food risks. *Appetite*, 41, 111-121.
- Hanss, D., & Böhm, G. (2012). Sustainability seen from the perspective of consumers. *International Journal of Consumer Studies*, 36(6), 678-687.
- Hayley, A., Zinkiewicz, L., & Hardiman, K. (2015). Values, attitudes, and frequency of meat consumption. Predicting meat-reduced diet in Australians. *Appetite*, 84, 98-106.
- Health Council of the Netherlands [Gezondheidsraad] (2011). *Richtlijnen goede voeding ecologisch belicht*. Den Haag: Gezondheidsraad.
- Heller, M. C., Keoleian, G. A., & Willett, W. C. (2013). Toward a life cycle-based, diet-level framework for food environmental impact and nutritional quality assessment: A critical review. *Environmental Science and Technology*, 47(22), 12632-12647.
- Henchion, M., McCarthy, M., Resconi, V. C., & Troy, D. (2014). Meat consumption: Trends and quality matters. *Meat Science*, 98(3), 561-568.
- Dietary Guidelines Advisory Committee (2015). *Scientific Report of the 2015 Dietary Guidelines Advisory Committee*. Washington, DC: USDA and US Department of Health and Human Services.
- Hine, D. W., Reser, J. P., Morrison, M., Phillips, W. J., Nunn, P., & Cooksey, R. (2014). Audience segmentation and climate change communication:

- conceptual and methodological considerations. *Wiley Interdisciplinary Reviews: Climate Change*, 5(4), 441-459.
- Hoek, A. C., Luning, P. A., Stafleu, A., & de Graaf, C. (2004). Food-related lifestyle and health attitudes of Dutch vegetarians, non-vegetarian consumers of meat substitutes, and meat consumers. *Appetite*, 42(3), 265-272.
- Hoek, A. C., Luning, P. A., Weijzen, P., Engels, W., Kok, F. J., & de Graaf, C. (2011). Replacement of meat by meat substitutes: A survey on person- and product-related factors in consumer acceptance. *Appetite*, 56(3), 662-673.
- Hoffman, S. R., Stallings, S. F., Bessinger, R. C., & Brooks, G. T. (2013). Differences between health and ethical vegetarians: Strength of conviction, nutrition knowledge, dietary restriction, and duration of adherence. *Appetite*, 65, 139-144.
- Homer, P. M., & Kahle, L. R. (1988). A structural equation test of the value-attitude-behavior hierarchy. *Journal of Personality and Social Psychology*, 54(4), 638-646.
- Honkanen, P., & Olsen, S. O. (2009). Environmental and animal welfare issues in food choice: The case of farmed fish. *British Food Journal*, 111(3), 293-309.
- Hoogland, C. T., de Boer, J., & Boersema, J. J. (2005). Transparency of the meat chain in the light of food culture and history. *Appetite*, 45(1), 15-23.
- Hu, L., & Bentler, P. M. (1999). Cut-off criteria for fit indexes in covariance matrix analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6(1), 1-55.
- Hustad, T. P., & Pessemier, E. A. (1974). The development and application of psychographic life style and associated activity and attitude measures. In W. D. Wells (Ed.), *Life style and psychographics* (pp. 31-70). Chicago: American Marketing Association.
- Hughner, R. S., McDonagh, P., Prothero, A., Shultz, C. J., & Stanton, J. (2007). Who are organic food consumers? A compilation and review of why people purchase organic food. *Journal of Consumer Behavior*, 6(2-3), 94-110.
- Insch, A., & Jackson, E. (2014). Consumer understanding and use of country-of-origin in food choice. *British Food Journal*, 116(1), 62-79.
- Jackson, T. (2005). *Motivating sustainable consumption: A review of evidence on consumer behaviour and behavioural change*. Guildford: University of Surrey.
- Jadczaková, V. (2013). Review of segmentation process in consumer markets. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 61(4), 1215-1224.
- Jager, W. (2000). *Modelling consumer behavior*, PhD thesis. Groningen: University of Groningen.
- Jain, S. K., & Kaur, G. (2006). Role of socio-demographics in segmenting and profiling green consumers: an exploratory study of consumers in India. *Journal of International Consumer Marketing*, 18, 107-146.

References

- Jalin, S. K., & Kaur, G. (2006). Role of socio-demographics in segmenting and profiling green consumers: An exploratory study of consumers in India. *Journal of International Consumer Marketing, 18*, 107-146.
- Janda, S., & Trocchia, P. J. (2001). Vegetarianism: Toward a greater understanding. *Psychology and Marketing, 18*(12), 1205-1240.
- Jang, Y. J., Kim, W. G., & Bonn, M. A. (2011). Generation Y consumers' selection attributes and behavioral intentions concerning green restaurants. *International Journal of Hospitality Management, 30*, 803-811.
- Janssen, M., Heid, A. & Hamm, U. (2009). Is there a promising market in between organic and conventional food? Analysis of consumer preferences. *Renewable Agriculture and Food Systems, 24*, 205-213.
- Jansson, J., Marell, A., & Nordlund, A. (2009). Elucidating green consumers: A cluster analytic approach on proenvironmental purchase and curtailment behaviors. *Journal of Euromarketing, 18*(4), 245-267.
- Jansson, J., Marell, A., & Nordlund, A. (2010). Green consumer behavior: Determinants of curtailment and eco-innovation adoption. *Journal of Consumer Marketing, 27*, 358-370.
- Joffe, M., & Robertson, A. (2001). The potential contribution of increased vegetable and fruit consumption to health gain in the European Union. *Public Health Nutrition, 4*(4), 893-901.
- Johansen, S. B., Næs, T., & Hersleth, M. (2011). Motivation for choice and healthiness perception of calorie-reduced dairy products - a cross-cultural study. *Appetite, 56*(1), 15-24.
- Joireman, J. A., Bennett, T. P., Richards, J., & Solaimani, S. (2001). Integrating social value orientation and the consideration of future consequences within the extended norm activation model of proenvironmental behaviour. *British Journal of Social Psychology, 40*, 133-155.
- Joireman, J., Shaffer, M. J., Balliet, D., & Strathman, A. (2012). Promotion orientation explains why future-oriented people exercise and eat healthy: Evidence from the two-factor Consideration of Future Consequences-14 scale. *Personality and Social Psychology Bulletin, 38*, 1272-1287.
- Jöreskog, K. G. (1994). On the estimation of polychoric correlations and their asymptotic covariance matrix. *Psychometrika, 59*(3), 381-389.
- Jungbluth, N., Tietje, O., & Scholz, R. (2000). Food purchases: Impacts from the consumers' point of view investigated with a modular LCA. *The International Journal of Life Cycle Assessment, 5*(3), 134-142.
- Kaiser, F. G. (1998). A general measure of ecological behavior. *Journal of Applied Social Psychology, 28*, 395-422.

- Kaiser, F. G., Wöfling, S., & Fuhrer, U. (1999). Environmental attitude and ecological behaviour. *Journal of Environmental Psychology, 19*(1), 1-19.
- Kareklas, I., Carlson, J., & Muehling, D. D. (2014). 'I eat organic for my benefit and yours': Egoistic and altruistic considerations for purchasing organic food and their implications for advertising strategists. *Journal of Advertising, 43*(1), 18-32.
- Kazbare, L., van Trijp, H. C. M., Eskildsen, J. K. (2010). A-priori and post-hoc segmentation in the design of healthy eating campaigns. *Journal of Marketing Communications, 16*(1-2), 21-45.
- Ketchen, D. J. Jr., & Shook, C. L. (1996). The application of cluster analysis in strategic management research: An analysis and critique. *Strategic Management Journal, 17*(6), 441-458.
- Kihlberg, I. & Risvik, E. (2007). Consumers of organic foods - value segments and liking of bread. *Food Quality and Preference, 18*, 471-481.
- Kornelis, M., van Herpen, E., van der Lans, I., & Aramyan, L. (2010). Using non-food information to identify food-choice segment membership. *Food Quality and Preference, 21*(5), 512-520.
- Korthals, M. (2012). Two evils in food country: Hunger and lack of representation. In D. M. Kaplan (Ed.), *The philosophy of food* (pp.103-122). Berkeley, CA: University of California Press.
- Kotabe, M., & Helsen, K. (2008). *Global marketing management*. Hoboken, NJ: Wiley.
- Kotler, P. (2002). *Marketing Management, Millenium edition*. Bostom, MA: Pearson Custom Publishing.
- Krystallis, A., de Barcellos, M. D., Kügler, J. O., Verbeke, W., & Grunert, K. G. (2009). Attitudes of European citizens towards pig production systems. *Livestock Science, 126*, 46-56.
- Lattin, J. M., Carroll, J. D., & Green, P. E. (2003). *Analyzing Multivariate Data*. Belmont CA: Brooks/Cole, Cengage Learning.
- Latvala, T., Niva, M., Mäkelä, J., Pouta, E., Heikkilä, J., Kotro, J., & Forsman-Hugg, S. (2012). Diversifying meat consumption patterns: Consumers' self-reported past behaviour and intentions for change. *Meat Science, 92*(1), 71-77.
- Lea, E., & Worsley, A. (2001). Influences on meat consumption in Australia. *Appetite, 36*(2), 127-136.
- Lea, E., & Worsley, A. (2003). Benefits and barriers to the consumption of a vegetarian diet in Australia. *Public Health Nutrition, 6*(5), 505-511.
- Lea, E., & Worsley, T. (2005). Australians' organic food beliefs, demographics and values. *British Food Journal, 107*(11), 855-869.
- Lea, E., & Worsley, A. (2008). Australian consumers' food-related environmental beliefs and behaviours. *Appetite, 50*(2-3), 207-214.

References

- Liberman, N., Trope, Y., & Wakslak, C. (2007). Construal level theory and consumer behavior. *Journal of Consumer Psychology, 17*(2), 113-117.
- Lindeman, M., & Väänänen, M. (2000). Measurement of ethical food choice motives. *Appetite, 34*(1), 55-59.
- Lockie, S., Lyons, K., Lawrence, G., & Grice, J. (2004). Choosing organics: A path analysis of factors underlying the selection of organic food among Australian consumers. *Appetite, 43*(2), 135-146.
- Lockie, S., Lyons, K., Lawrence, G., & Mummery, K. (2002). Eating 'green': Motivations behind organic food consumption in Australia. *Sociologia Ruralis, 42*, 23-40.
- Loebnitz, N., Mueller Loose, S., & Grunert, K. G. (2015). Impacts of situational factors on process attribute uses for food purchases. *Food Quality and Preference, 44*, 84-91.
- Lorek, S., & Fuchs, D. (2013). Strong sustainable consumption governance – precondition for a degrowth path? *Journal of Cleaner Production, 38*, 36-43.
- Lorek, S., & Vergragt, P. J. (2015). Sustainable consumption as a systemic challenge: inter-and transdisciplinary research and research questions. In L. A. Reisch & J. B. Thøgersen (Eds.), *Handbook of research on sustainable consumption* (pp. 19-33). Northampton, MA: Edward Elgar Publishing.
- Lusk, J. L. (2011). External validity of the food values scale. *Food Quality and Preference, 22*(5), 452-462.
- MacDiarmid, J. I. (2013). Is a healthy diet an environmentally sustainable diet? *Proceedings of the Nutrition Society, 72*(1), 13-20.
- Magnusson, M. K., Arvola, A., Hursti, U.-K. K., Åberg, L., & Sjöden, P.-O. (2001). Attitudes towards organic foods among Swedish consumers. *British Food Journal, 103*(3), 209-227.
- Magnusson, M. K., Arvola, A., Hursti, U.-K. K., Åberg, L., & Sjöden, P.-O. (2003). Choice of organic foods is related to perceived consequences for human health and to environmentally friendly behaviour. *Appetite, 40*(2), 109-117.
- Mäkinen, J. P., & Vainio, A. (2014). Barriers to climate-friendly food choices among young adults in Finland. *Appetite, 74*, 12-19.
- Markovina, J., Stewart-Knox, B. J., Rankin, A., Gibney, M., de Almeida, M. D. V., Fischer, A., . . . Frewer, L. J. (2015). Food4Me study: Validity and reliability of Food Choice Questionnaire in 9 European countries. *Food Quality and Preference, 45*, 26-32.
- Mazar, N., & Zhong, C.-B. (2010). Do green products make us better people? *Psychological Science, 21*(4), 494-498.

- McMeekin A., & Southerton, D. (2012). Sustainability transitions and final consumption: practices and socio-technical systems. *Technology Analysis & Strategic Management*, 24(4), 345–361.
- McMichael, A. J., Powles, J. W., Butler, C. D., & Uauy, R. (2007). Food, livestock production, energy, climate change, and health. *The Lancet*, 370(9594), 1253-1263.
- Messick, D. M., & McClintock, C. G. (1968). Motivational bases of choice in experimental games. *Journal of Experimental Social Psychology*, 4(1), 1-25.
- Milfont, T. L., & Gouveia, V. V. (2006). Time perspective and values: An exploratory study of their relations to environmental attitudes. *Journal of Environmental Psychology*, 26(1), 72-82.
- Milfont, T. L., Duckitt, J., & Wagner, C. (2010). A cross-cultural test of the value-attitude-behavior hierarchy. *Journal of Applied Social Psychology*, 40(11), 2791-2813.
- Ministry of Agriculture, Nature and Food quality (the Netherlands) [LNV] (2009). *Nota Duurzaam Voedsel: Naar een duurzame consumptie en productie van ons voedsel [Memorandum Sustainable Food: Towards a sustainable consumption and production of our food]*. The Hague: LNV.
- Moisander, J. (2007). Motivational complexity of green consumerism. *International Journal of Consumer Studies*, 31, 404-409.
- Moser, S. C. (2010). Communicating climate change: history, challenges, process and future directions. *Wiley Interdisciplinary Reviews: Climate Change*, 1(1), 31-53.
- Moser, A. K. (2015). Thinking green, buying green? Drivers of pro-environmental purchasing behavior. *Journal of Consumer Marketing*, 32(3), 167-175.
- Moser, R., Raffaelli, R., & Thilmany-McFadden, D. (2011). Consumer preferences for fruit and vegetables with credence-based attributes: A review. *International Food and Agribusiness Management Review*, 14(2), 121-142.
- Mostafa, M. M. (2009). Shades of green: A psychographic segmentation of the green consumer in Kuwait using self-organizing maps. *Expert Systems with Applications*, 36, 11030-11038.
- Nasir, V. A., & Karakaya, F. (2014). Consumer segments in organic foods market. *Journal of Consumer Marketing*, 31(4), 263-277.
- Naska, A., Vasdekis, V. G. S., Trichopoulou, A., Friel, S., Leonhäuser, I. U., Moreiras, O., . . . Zajkás, G. (2000). Fruit and vegetable availability among ten European countries: How does it compare with the 'five-a-day' recommendation? *British Journal of Nutrition*, 84(4), 549-556.
- Newman, G. E., Gorlin, M., & Dhar, R. (2014). When going green backfires: How firm intentions shape the evaluation of socially beneficial product enhancements. *Journal of Consumer Research*, 41(3), 823-839.

References

- Ng, M., Fleming, T., Robinson, M., Thomson, B., Graetz, N., Margono, C., . . . Gakidou, E. (2014). Global, regional, and national prevalence of overweight and obesity in children and adults during 1980-2013: A systematic analysis for the Global Burden of Disease Study 2013. *The Lancet*, *384*(9945), 766-781.
- Nie, C., & Zepeda, L. (2011). Lifestyle segmentation of US food shoppers to examine organic and local food consumption. *Appetite*, *57*, 28-37.
- Noar, S. M., Benac, C. N., & Harris, M. S. (2007). Does tailoring matter? Meta-analytic review of tailored print health behavior change interventions. *Psychological Bulletin*, *133*(4), 673.
- Nordgren, A. (2012). Ethical issues in mitigation of climate change: the option of reduced meat production and consumption. *Journal of Agricultural and Environmental Ethics*, *25*(4), 563-584.
- Nurse Rainbolt, G., Onozaka, Y., & McFadden, D. T. (2012). Consumer motivations and buying behavior: The case of the local food system movement. *Journal of Food Products Marketing*, *18*(5), 385-396.
- Nutrition Centre of the Netherlands [Voedingscentrum], retrieved March 15, 2015, from <http://www.voedingscentrum.nl>.
- Olsen, J. C., & Reynolds, T. J. (1983). Understanding consumers' cognitive structures: Implications for advertising strategy. *Advertising and consumer psychology*, *1*, 77-90.
- Onwezen, M. C., Antonides, G., & Bartels, J. (2013). The norm activation model: An exploration of the functions of anticipated pride and guilt in pro-environmental behaviour. *Journal of Economic Psychology*, *39*, 141-153.
- Onwezen, M. C., & Bartels, J. (2011). Which perceived characteristics make product innovations appealing to the consumer? A study on the acceptance of fruit innovations using cross-cultural consumer segmentation. *Appetite*, *57*(1), 50-58.
- Onwezen, M. C., Reinders, M. J., van der Lans, I. A., Sijtsema, S. J., Jasiulewicz, A., Dolors Guardia, M., & Guerrero, L. (2012). A cross-national consumer segmentation based on food benefits: The link with consumption situations and food perceptions. *Food Quality and Preference*, *24*(2), 276-286.
- Ozcaglar-Toulouse, N., Shiu, E., & Shaw, D. (2006). In search of fair trade: Ethical consumer decision making in France. *International Journal of Consumer Studies*, *30*(5), 502-514.
- Parras-Rosab, M., Vega-Zamora, M., Murgado-Armenteros, E. M., & Torres-Ruiz, F. J. (2013). A powerful word: The influence of the term 'organic' on perceptions and beliefs concerning food. *International Food and Agribusiness Management Review*, *16*(4), 51-76.

- Petty, R. E., & Cacioppo, J. T. (1984). The effects of involvement on responses to argument quantity and quality: Central and peripheral routes to persuasion. *Journal of Personality and Social Psychology*, 46(1), 69-81.
- Pelletier, J. E., Laska, M. N., Neumark-Sztainer, D., & Story, M. (2013). Positive attitudes toward organic, local, and sustainable foods are associated with higher dietary quality among young adults. *Journal of the Academy of Nutrition and Dietetics*, 113(1), 127-132.
- Pieniak, Z., Verbeke, W., Olsen, S. O., Hansen, K. B., & Brunsø, K. (2010). Health-related attitudes as a basis for segmenting European fish consumers. *Food Policy*, 35(5), 448-455.
- Pimentel, D., & Pimentel, M. (2003). Sustainability of meat-based and plant-based diets and the environment. *American Journal of Clinical Nutrition*, 78(3), S660–S663.
- Pinker, S. (2011). *The better angels of our nature: The decline of violence in history and its causes*. London: Allen Lane.
- Pollard, T. M., Steptoe, A., & Wardle, J. (1998). Motives underlying healthy eating: Using the food choice questionnaire to explain variation in dietary intake. *Journal of Biosocial Science*, 30(2), 165-179.
- Pomerleau, J., Lock, K., McKee, M., & Altmann, D. R. (2004). The challenge of measuring global fruit and vegetable intake. *Journal of Nutrition*, 134(5), 1175-1180.
- Povey, R., Wellens, B., & Conner, M. (2001). Attitudes towards following meat, vegetarian and vegan diets: An examination of the role of ambivalence. *Appetite*, 37(1), 15-26.
- Prochaska, J. O., & Velicer, W. F. (1997). The transtheoretical model of health behavior change. *American Journal of Health Promotion*, 12(1), 38-48.
- Raats, M. M., Shepherd R., & Sparks, P. (1995). Including moral dimensions of choice within the structure of the Theory of Planned Behaviour. *Journal of Applied Social Psychology*, 25(6), 484-494.
- Raghunathan, R., Naylor, R. W., & Hoyer, W. D. (2006). The unhealthy = tasty intuition and its effects on taste inferences, enjoyment, and choice of food products. *Journal of Marketing*, 70(4), 170-184.
- Raphaely, T., & Marinova, D. (2014). Flexitarianism: Decarbonising through flexible vegetarianism. *Renewable Energy*, 67, 90-96.
- Ravn Heerwagen, L., Mørch Andersen, L., Christensen, T., & Sandøe, P. (2014). Can increased organic consumption mitigate climate changes? *British Food Journal*, 116(8), 1314-1329.

References

- Rayner, M., & Scarborough, P. D. (2013). How much meat and milk is optimal for health? In J. D'Silva & J. Webster (Eds.), *The meat crisis: Developing more sustainable production and consumption* (pp. 190-206). Earthscan.
- Raynolds, L. T. (2002). Consumer/producer links in Fair Trade coffee networks. *Sociologia Ruralis*, 42, 404-424.
- Realini, C. E., Kallas, Z., Pérez-Juan, M., Gómez, I., Olleta, J. L., Beriain, M. J., . . . Sañudo, C. (2014). Relative importance of cues underlying Spanish consumers' beef choice and segmentation, and consumer liking of beef enriched with n-3 and CLA fatty acids. *Food Quality and Preference*, 33, 74-85.
- Reisch, L., Eberie, U., & Lorek, S. (2013). Sustainable food consumption: an overview of contemporary issues and policies. *Sustainability: Science, Practice & Policy*, 9(2), 7-25.
- Reisch, L. A., Gwozdz, W., Barba, G., De Henauw, S., Lascorz, N., & Pigeot, I. (2013). Experimental evidence on the impact of food advertising on children's knowledge about and preferences for healthful food. *Journal of Obesity*, 2013.
- Reynolds, J. C., Buckley, D. J., Weinstein, P., & Boland, J. (2014). Are the dietary guidelines for meat, fat, fruit and vegetable consumption appropriate for environmental sustainability? A review of the literature. *Nutrients*, 6(6), 2251-2265.
- Reynolds, T. J., & Gutman, J. (1988). Laddering theory, method, analysis, and interpretation. *Journal of Advertising Research*, 28(1), 11-31.
- Richardson, N., MacFie, H., & Shepherd, R. (1994a). Consumer attitudes to meat eating. *Meat Science*, 36(1-2), 7-65.
- Richardson, N., Shepherd, R., & Elliman, N. (1994b). Meat consumption, definition of meat and trust in information sources in the UK population and members of the vegetarian society. *Ecology of Food and Nutrition*, 33(1-2), 1-13.
- Robinson, R., & Smith, C. (2002). Psychosocial and demographic variables associated with consumer intention to purchase sustainably produced foods as defined by the Midwest Food Alliance. *Journal of Nutrition Education and Behavior*, 34(6), 316-325.
- Roberts, P. (2009). *The end of food: the coming crisis in the world food industry*. London: Bloomsbury.
- Rokeach, M. (1973). *The nature of human values*. New York: Free Press.
- Ronteltap, A., Sijtsema, S. J., Dagevos, H., & de Winter, M. A. (2012). Construal levels of healthy eating: Exploring consumers' interpretation of health in the food context. *Appetite*, 59(2), 333-340.
- Rothgerber, H. (2012). Real men don't eat (vegetable) quiche. Masculinity and the justification of meat consumption. *Psychology of Men & Masculinity*, 14(4), 363-375.

- Rothgerber, H. (2014). A comparison of attitudes toward meat and animals among strict and semi-vegetarians. *Appetite*, 72, 98-105.
- Rothschild, M. L. (1999). Carrots, sticks, and promises: A conceptual framework for the management of public health and social issue behaviors. *The Journal of Marketing*, 63(4), 24-37.
- Rozin, P. (2007). Food choice: An introduction. In L. Frewer & H. C. M. van Trijp (Eds.), *Understanding consumers of food products* (pp. 3–29). Cambridge: Woodhead Publishing.
- Rozin, P., Hormes, J. M., Faith, M. S., & Wansink, B. (2012). Is meat male? A quantitative multimethod framework to establish metaphoric relationships. *Journal of Consumer Research*, 39(3), 629-643.
- Rozin, P., Markwith, M., & Stoess, C. (1997). Moralization and becoming a vegetarian: The transformation of preferences into values and the recruitment of disgust. *Psychological Science*, 8(2), 67-73.
- Ruby, M. B., & Heine, S. J. (2011). Meat, morals, and masculinity. *Appetite*, 56(2), 447-450.
- Ruby, M. B. (2012). Vegetarianism. A blossoming field of study. *Appetite*, 58(1), 141-150.
- Saba, A., & Messina, F. (2003). Attitudes towards organic foods and risk/benefit perception associated with pesticides. *Food Quality and Preference*, 14, 637-645.
- Sautron, V., Péneau, S., Camilleri, G. M., Muller, L., Ruffieux, B., Hercberg, S., & Méjean, C. (2015). Validity of a questionnaire measuring motives for choosing foods including sustainable concerns. *Appetite*, 87, 90-97.
- Scarborough, P., Allender, S., Clarke, D., Wickramasinghe, K., & Rayner, M. (2012). Modelling the health impact of environmentally sustainable dietary scenarios in the UK. *European Journal of Clinical Nutrition*, 66(6), 710-715.
- Schäfer, M., Jaeger-Erben, M., & dos Santos, A. (2011). Leapfrogging to sustainable consumption? An explorative survey of consumption habits and orientations in Southern Brazil. *Journal of Consumer Policy*, 34, 175–196.
- Scholl, G., Rubik, F., Kalimo, H., Biedenkopf, K., & Söebeck, O. (2010). Policies to promote sustainable consumption: Innovative approaches in Europe. *Natural Resources Forum*, 34(1), 39-50.
- Schösler, H., de Boer, J., & Boersema, J. J. (2012). Can we cut out the meat of the dish? Constructing consumer-oriented pathways towards meat substitution. *Appetite*, 58, 39-47.
- Schuldt, J. P., & Hannahan, M. (2013). When good deeds leave a bad taste. Negative inferences from ethical food claims. *Appetite*, 62, 76-83.
- Schuldt, J. P., Muller, D., & Schwarz, N. (2012). The “Fair Trade” effect: Health halos from social ethics claims. *Social Psychological and Personality Science*, 3(5), 581-589.

References

- Schuldt, J. P., & Schwarz, N. (2010). The 'organic' path to obesity? Organic claims influence calorie judgment and exercise recommendations. *Judgment and Decision Making*, 5(3), 144-150.
- Schultz, P. W., & Zelezny, L. (2003). Reframing environmental messages to be congruent with American values. *Human Ecology Review*, 10(2), 126-136.
- Schwartz, S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. In M. P. Zanna (Ed.), *Advances in Experimental Social Psychology* (pp. 1-65). San Diego, CA: Academic.
- Schwartz, S. H. (1994). Are there universal aspects in the structure and contents of human values? *Journal of Social Issues*, 50(4), 19-45.
- Schwartz, S. H. (2010). Basic values: How they motivate and inhibit prosocial behavior. In M. Mikulincer & P. R. Haver (Eds.), *Prosocial motives, emotions, and behavior: The better angels of our nature* (pp. 221-241). Washington, DC: American Psychological Association.
- Schwartz, S. H. (1977). Normative influence on altruism. *Advances in experimental social Psychology*, 10, 221-279.
- Schwartz, S. H., & Bilsky, W. (1987). Toward a universal psychological structure of human values. *Journal of Personality and Social Psychology*, 53(3), 550-562.
- Shaw, D., Shiu, E., & Clarke, I. (2000). The contribution of ethical obligation and self-identity to the Theory of Planned Behaviour: An exploration of ethical consumers. *Journal of Marketing Management*, 16(8), 879-894.
- Sijtsema, S. J., Jesionkowska, K., Symoneaux, R., Konopacka, D., & Snoek, H. (2012). Perceptions of the health and convenience characteristics of fresh and dried fruits. *LWT - Food Science and Technology*, 49(2), 275-281.
- Slater, M. D. (1996). Theory and method in health audience segmentation. *Journal of Health Communication*, 1(3), 267-283.
- Smart, B. (2010). *Consumer society: Critical issues and environmental consequences*. London: Sage.
- Solomon, M., Bamossy, G., & Askegaard, S. (2002). *Consumer behaviour: A European perspective* (2nd ed.). Harlow: Financial Times/Prentice Hall.
- Sousa, R. (2012). The moderating effect of channel use on the quality-loyalty relationship in multi-channel e-services. *International Journal of Quality and Reliability Management*, 29(9), 1019-1037.
- Spaargaren, G., & Oosterveer, P. (2010). Citizen-consumers as agents of change in globalizing modernity: The case of sustainable consumption. *Sustainability*, 2, 1887-1908.
- SPSS Inc., (2010). *SPSS user manual*. IBM.

- Steenkamp, J. B. E. M., & ter Hofstede, F. (2002). International market segmentation: Issues and perspective. *International Journal of Research in Marketing*, 19(3), 185-213.
- Steiger, J. H. (2007). Understanding the limitations of global fit assessment in structural equation modelling. *Personality and Individual Differences*, 42(5), 893-899.
- Step toe, A., Pollard, T. M., & Wardle, J. (1995). Development of a measure of the motives underlying the selection of food: The Food Choice Questionnaire. *Appetite*, 25(3), 267-284.
- Stern, P. C. (2000). Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues*, 56(3), 407-424.
- Stern, P. C., & Dietz, T. (1994). The Value Basis of Environmental Concern. *Journal of Social Issues*, 50(3), 65-84.
- Stern, P. C., Dietz, T., & Kalof, L. (1993). Value orientations, gender, and environmental concern. *Environment & Behavior*, 25(3), 322-348.
- Strathman, A., Gleicher, F., Boninger, D. S., & Edwards, C. S. (1994). The consideration of future consequences: Weighing immediate and distant outcomes of behavior. *Journal of Personality and Social Psychology*, 66(4), 742-752.
- Tanner, C., & Kast, S. W. (2003). Promoting sustainable consumption: Determinants of green purchases by Swiss consumers. *Psychology and Marketing*, 20(10), 883-902.
- Temme, E. H., van der Voet, H., Thissen, J. T., Verkaik-Kloosterman, J., van Donkersgoed, G., & Nonhebel, S. (2013). Replacement of meat and dairy by plant-derived foods: Estimated effects on land use, iron and SFA intakes in young Dutch adult females. *Public Health Nutrition*, 16(10), 1900-1907.
- Thøgersen, J., & Crompton, T. (2009). Simple and painless? The limitations of spillover in environmental campaigning. *Journal of Consumer Policy*, 32(2), 141-163.
- Thøgersen, J., & Ölander, F. (2003). Spillover of environment-friendly consumer behavior. *Journal of Environmental Psychology*, 23, 225-236.
- Tiefenbeck, V., Staake, T., Roth, K., & Sachs, O. (2013). For better or for worse? Empirical evidence of moral licensing in a behavioral energy conservation campaign. *Energy Policy*, 57, 160-171.
- Tilman, D., & Clark, M. (2014). Global diets link environmental sustainability and human health. *Nature*, 515(7528), 518-522.
- Tivadar, B., & Luthar, B. (2005). Food, ethics and aesthetics. *Appetite*, 44, 215-233.
- Tobler, C., Visschers, V. H. M., & Siegrist, M. (2011). Eating green: Consumers' willingness to adopt ecological food consumption behaviors. *Appetite*, 57(3), 674-682.

References

- Toma, L., McVittie, A., Hubbard, C., & Stotta, A. W. (2011). A structural equation model of the factors influencing British consumers' behavior toward animal welfare. *Journal of Food Products Marketing*, 17(2-3), 261-278.
- Trichopoulou, A., Naska, A., Antoniou, A., Friel, S., Trygg, K., & Turrini, A. (2003). Vegetable and fruit: The evidence in their favour and the public health perspective. *International Journal for Vitamin and Nutrition Research*, 73(2), 63-69.
- Tukker, A., Goldbohm, R. A., de Koning, A., Verheijden, M., Kleijn, R., Wolf, O., Pérez-Domínguez, I., & Rueda-Cantuche, J. M. (2011). Environmental impacts of changes to healthier diets in Europe. *Ecological Economics*, 70(10), 1776-1788.
- Tukker, A., & Jansen, B. (2006). Environmental impacts of products: A detailed review of studies. *Journal of Industrial Ecology*, 10, 159-182.
- Twigg, J. (1983). Vegetarianism and the meanings of meat. In A. Murcott (Ed.), *The Sociology of Food and Eating* (pp.18-30). Farnborough: Gower.
- Van Beek, J., Antonides, G., & Handgraaf, M. J. J. (2013). Eat now, exercise later: The relation between consideration of immediate and future consequences and healthy behavior. *Personality and Individual Differences*, 54(6), 785-791.
- Van Dam, Y. K., & van Trijp, H. C. M. (2011). Cognitive and motivational structure of sustainability. *Journal of Economic Psychology*, 32(5), 726-741.
- Van der Zanden, L. D. T., van Kleef, E., de Wijk, R. A., & van Trijp, H. C. M. (2014). Understanding heterogeneity among elderly consumers: An evaluation of segmentation approaches in the functional food market. *Nutrition Research Reviews*, 27(1), 159-171.
- Van Dooren, C., Marinussen, M., Blonk, H., Aiking, H., & Vellinga, P. (2014). Exploring dietary guidelines based on ecological and nutritional values: A comparison of six dietary patterns. *Food Policy*, 44, 36-46.
- Vanhonacker, F., van Loo, E. J., Gellynck, X., & Verbeke, W. (2013). Flemish consumer attitudes towards more sustainable food choices. *Appetite*, 62, 7-16.
- Vanhonacker, F., & Verbeke, W. (2009). Buying higher welfare poultry products? Profiling flemish consumers who do and do not. *Poultry Science*, 88(12), 2702-2711.
- Van Lange, P. A. M., Joireman, J., Parks, C. D., & van Dijk, E. (2013). The psychology of social dilemmas: A review. *Organizational Behavior and Human Decision Processes*, 120(2), 125-141.
- Van Raaij, W. F., & Verhallen, T. M. M. (1994). Domain-specific market segmentation. *European Journal of Marketing*, 28(10), 49-66.
- Van Rossum, C. T. M., Fransen, H. P., Verkaik-Kloosterman, J., Buurma-Rethans, E. J. M., & Ocké, M. C. (2011). *Dutch national food consumption survey 2007-2010*.

- National Institute for Public Health and the Environment [RIVM] – Ministry of Health, Welfare and Sport.
- Van Strien, T. & Koenders, P. G. (2012). How do life style factors relate to general health and overweight? *Appetite*, *58*, 265–270.
- Van 't Riet, J., Sijtsma, S. J., Dagevos, H., & de Bruijn, G.-J. (2011). The importance of habits in eating behaviour. An overview and recommendations for future research. *Appetite*, *57*(3), 585-596.
- Van Trijp, H. C. M., & Fischer, A. R. H. (2011). Mobilizing consumer demand for sustainable development. In H. van Latesteijn & K. Andeweg (Eds.), *The Transform model: Transforming agro innovation towards sustainable development* (pp. 73-96). Dordrecht: Springer.
- Van 't Veer, P., Jansen, M. C., Klerk, M., & Kok, F. J. (2000). Fruits and vegetables in the prevention of cancer and cardiovascular disease. *Public Health Nutrition*, *3*(1), 103-107.
- Verain, M. C. D., Bartels, J., Dagevos, H., Sijtsma, S. J., Onwezen, M. C., & Antonides, G. (2012). Segments of sustainable food consumers: A literature review. *International Journal of Consumer Studies*, *36*(2), 123-132.
- Verain, M. C. D., Dagevos, H., & Antonides, G. (2015). Flexitarianism: A range of sustainable food styles. In L. A. Reisch & J. B. Thøgersen (Eds.), *Handbook of Research on Sustainable Consumption* (pp. 209-223). Cheltenham: Edward Elgar Publishing.
- Verain, M. C. D., Dagevos, H., & Antonides, G. (2015). Sustainable food consumption. Product choice or curtailment? *Appetite*, *91*, 375-384.
- Verain, M. C. D., Sijtsma, S. J., & Antonides, G. (2016). Consumer segmentation based on food-category attribute importance: The relation with healthiness and sustainability perceptions. *Food Quality and Preference*, *48*, 99-106.
- Verbeke, W. (2015). Profiling consumers who are ready to adopt insects as a meat substitute in a Western society. *Food Quality and Preference*, *39*, 147-155.
- Verbeke, W., & Vackier, I. (2004). Profile and effects of consumer involvement in fresh meat. *Meat Science*, *67*(1), 159-168.
- Verbeke, W., van Oeckel, M. J., Warnants, N., Viaene, J. & Boucqué, C. V. (1999). Consumer perception, facts and possibilities to improve acceptability of health and sensory characteristics of pork. *Meat Science*, *53*, 77-99.
- Verbeke, W., & Viaene, J. (1999). Beliefs, attitude and behaviour towards fresh meat consumption in Belgium: Empirical evidence from a consumer survey. *Food Quality and Preference*, *10*, 437-445.
- Vermeir, I., & Verbeke, W. (2006). Sustainable food consumption: Exploring the consumer “attitude – behavioral intention” gap. *Journal of Agricultural and Environmental Ethics*, *19*(2), 169-194.

References

- Verplanken, B., & Orbell, S. (2003). Reflections on past behavior: A self-report index of habit strength. *Journal of Applied Social Psychology, 33*(6), 1313-1330.
- Vetőné Móznér, Z. (2014). Sustainability and consumption structure: Environmental impacts of food consumption clusters. A case study for Hungary. *International Journal of Consumer Studies, 38*(5), 529-539.
- Vinnari, M., Mustonen, P., & Räsänen, P. (2010). Tracking down trends in non-meat consumption in Finnish households, 1966-2006. *British Food Journal, 112*, 836-852.
- Vinnari, M., & Tapio, P. (2012). Sustainability of diets: From concepts to governance. *Ecological Economics, 74*, 46-54.
- Vinnari, M. & Vinnari, E. (2013). A framework for sustainable transition: the case of plant-based diets. *Journal of Agricultural and Environmental Ethics, 27*, 369-396.
- Vinson, D. E., Scott, J. E., & Lamont, L. M. (1977). The role of personal values in marketing and consumer behavior. *The Journal of Marketing, 44*-50.
- Vittersø, G., & Tangeland, T. (2015). The role of consumers in transitions towards sustainable food consumption. The case of organic food in Norway. *Journal of Cleaner Production, 92*, 91-99.
- Vreugdenhil, J. (2014). *Eten is meer dan een optelsom [Eating is more than a sum]*. NRC.
- Walley, K., Custance, P., & Parsons, S. (2000). UK consumer attitudes concerning environmental issues impacting the agrifood industry. *Business Strategy and the Environment, 9*, 355-366.
- Wedel, M., & Desarbo, W. S. (2002). Market segment derivation and profiling via a finite mixture model framework. *Marketing Letters, 13*(1), 17-25.
- Wedel, M., & Kamakura, W. (2000). *Market segmentation: Conceptual and methodological foundations* (2nd ed.). Boston: Kluwer Academic Publishers.
- Wedel, M. & Kamakura, W. (2002). Introduction to the special issue on market segmentation. *International Journal of Research in Marketing, 19*, 181-183.
- Weigel, R. H., & Newman, L. S. (1976). Increasing attitude-behavior correspondence by broadening the scope of the behavioral measure. *Journal of Personality and Social Psychology, 33*(6), 793-802.
- Weinstein, A. (1987). *Market segmentation: using demographics, psychographics and other segmentation techniques to uncover and exploit new markets*. Chicago: Probus.
- Westhoek, H., Lesschen, J. P., Rood, T., Wagner, S., De Marco, A., Murphy-Bokern, D., . . . Oenema, O. (2014). Food choices, health and environment: Effects of cutting Europe's meat and dairy intake. *Global Environmental Change, 26*(1), 196-205.
- Westhoek, H., Rood, T., van den Berg, M., Janse, J., Nijdam, D., Reudink, M. & Stehfest, E. (2011). The Protein Puzzle: The consumption and production of

- meat, dairy and fish in the European Union. *European Journal of Food Research & Review*, 1(3), 123-144.
- Wetenschappelijke Raad voor het Regeringsbeleid (WRR) [Scientific Council for the Government Policy] (2014). *Naar een voedselbeleid [Towards a food policy]*. Amsterdam: Amsterdam University Press.
- Wilson, B. J. (2007). Designing media messages about health and nutrition: what strategies are most effective? *Journal of Nutrition Education and Behavior*, 39(2), S13-S19.
- Yue, C., Grebitus, C., Bruhn, M., & Jensen, H. H. (2010). Marketing organic and conventional potatoes in Germany. *Journal of International Food and Agribusiness Marketing*, 22, 164-178.
- Zakowska-Biemans, S. (2011). Polish consumer food choices and beliefs about organic food. *British Food Journal*, 113, 122–137.
- Zur, I., & Klöckner, C. A. (2014). Individual motivations for limiting meat consumption. *British Food Journal*, 116(4), 629-642.

Summary



Contemporary western consumption patterns are related to a range of sustainability issues such as air and water pollution, loss in biodiversity, animal welfare and fair prices. Sustainability is a multifaceted concept and in the context of food, it comprises environmental aspects, animal welfare issues and ethical working conditions. Technological progress has long been viewed as the solution to sustainability problems in the food domain, but the importance of consumption levels has recently received particular attention. This thesis will contribute to a better understanding of sustainable food consumption practices and thereby supports a shift towards more sustainable diets.

The overall aim of this research is to identify and provide insights into consumer lifestyle segments regarding sustainable food consumption. In researching consumer motivations and behaviors concerning sustainable food consumption, it is important to take the heterogeneity of consumers into account. One way to deal with heterogeneity is through consumer segmentation. Consumers can be segmented in many ways, but we emphasize the importance of lifestyle segmentation. Lifestyle variables are crucial in understanding why consumers behave like they do. Lifestyles provide cognitive insights into consumers, are closely related to behavior and are useful in developing communication strategies. This thesis consists of seven chapters, to be discussed next.

Chapter 1, the general introduction, outlines the societal, theoretical and methodological context in which the thesis research should be placed. The chapter provides an overview of what constitutes a sustainable diet and distinguishes two types of sustainable consumption. First, consumers can select products that have been produced in a sustainable way, such as organic, fair trade or animal friendly products. Second, consumers can have sustainable dietary patterns which are low in animal-based products and high in plant-based products. From the literature it becomes clear that the reduction of meat and dairy consumption are the main priorities in reaching sustainable diets. Furthermore, Chapter 1 places the research in a theoretical context by discussing the value-lifestyle-behavior hierarchy and related consumer theories. In addition, Chapter 1 discusses the importance of carefully considering the level of specificity on which (segmentation) variables are operationalized. Operationalization can be, for example, on a general, a domain-specific or a product-specific level. In the context of sustainable food consumption, the level of the product category is highly relevant, because of the urge to consume less meat and dairy and more plant-based products.

A first question that should be asked in researching sustainable consumer segments is whether they exist and how we could identify consumer segments related to sustainable food. Therefore, **Chapter 2** provides an overview of the available literature on sustainable consumer segmentation in the food domain. This chapter provides insight

into the types of variables that are used to identify and profile consumer segments. The variables were categorized into three hierarchical levels: personality characteristics, food-related lifestyle, and behavior. In addition, insights into the characteristics of three main consumer segments (greens, potential greens and non-greens) were gained. All hierarchical levels appeared to discriminate between these consumer segments. The findings imply that future segmentation studies should consider variables on all three hierarchical levels to get a complete picture of existing consumer segments regarding sustainable food.

The next three chapters describe three segmentation studies at the product-category level, in order to identify consumer segments in the food domain. **Chapter 3** explores different types of sustainable food behaviors. Two types of sustainable food behaviors were identified: sustainable product choices (e.g. animal-friendly product variants) and curtailment of consumption in unsustainable product categories (meat and dairy). This chapter shows that these two types of sustainable food behaviors can be empirically distinguished and that four consumer segments can be identified based on these behaviors: unsustainers, curtailers, product-oriented consumers and sustainers. In addition, predictor variables of both types of behaviors only partly overlap. This chapter concludes that it is important to distinguish curtailment behavior and sustainable product choices as consumers differ not only quantitatively, in their level of sustainable food consumption, but also qualitatively, in the type of behavior they employ.

Although it is relevant to get insights into the types and levels of sustainable food consumption, understanding the “why” of consumption is crucial in influencing sustainable food behaviors. Therefore, **Chapter 4** focuses on consumer motivations and investigates the importance of product-category attributes. Segments are identified based on importance ratings of a range of sustainability attributes, as well as taste, price and health. Results show that all sustainability aspects can be combined into one sustainability factor, and price, taste and health can be combined into one pro-self factor. These two factors should be identified separately for each of four product-categories (meat, dairy, fish and vegetables) in order to get the best fit. Based on these factors, three consumer segments have been identified: pro-self, average and sustainable conscious consumers. Also, the perception of synergy between health and sustainability was studied. The results showed that perceived synergy differed across segments and was strongest among sustainable conscious consumers. The perceived synergy can be used in stimulating sustainable consumption and is further investigated in Chapter 6.

Chapter 4 makes clear that product-category differences are relevant in studying sustainable food lifestyles. Therefore, **Chapter 5** will take a closer look at curtailment

of the most unsustainable product category: meat. Insights are gained into consumer segments that differ in their meat-related lifestyles as well as in their level of meat consumption. Five consumer segments have been identified: meat lovers, unconscious flexitarians, conscious flexitarians, compulsive meat consumers and potential flexitarians. These segments not only differed in their meat-related norms, perceptions and motivations, but also in their level of meat consumption. The chapter concludes that flexitarianism appears a promising trend towards more sustainable food consumption, and that segments need different approaches in order to stimulate a reduction of their meat consumption.

Chapter 6 extends the findings of Chapter 4. The same segmentation basis is used, but additional personal characteristics extend our insights into the identified segments. In addition, this chapter explores communication strategies to approach the identified segments with a dietary guideline that benefits both healthiness and sustainability of contemporary diets. An experiment is conducted to test whether the guideline to consume less animal-based and more plant-based products can best be framed as healthy, as sustainable, or as both healthy and sustainable. For all segments, it is advisable to combine health and sustainability arguments, but the effect of such a message varies across segments. A (positive) effect on sustainable intentions is only found for sustainable conscious consumers in the category of meat. Therefore, the findings indicate the importance of tailoring dietary messages to specific consumer segments, and to take product-category differences into account.

In **Chapter 7**, the main findings and their implications are discussed. Overall, several key lessons can be learned from the chapters in this thesis:

- Sustainability is unidimensional in people's motives, intentions and behaviors.
- On the behavioral level, two types of sustainable consumption can be distinguished: curtailment and sustainable product choices.
- Sustainable consumer segments exist, but other food choice motives are also important for these consumers and should not be neglected.
- Sustainability can be linked to health.
- Lifestyle-based segments need different approaches to shift their diets towards more sustainable consumption.
- All levels of the hierarchy of constructs (personal characteristics, lifestyle and behavior) are helpful in understanding sustainable food segments.
- Product-category differences in lifestyle variables should be considered.

To conclude, this research provides theoretical as well as practical contributions, and has opened up new research directions for exploring food-related consumer

segments and ways to shift consumer diets towards more sustainable levels. The findings of this thesis offer a good starting point to examine further how consumer segments can best be identified in the domain of sustainable food and, in particular, which pathways should be taken to stimulate sustainable food consumption in these segments. Overall, the research presented in this thesis contributes to a better understanding of sustainable food consumption and thereby supports a shift towards more sustainable diets.

Samenvatting



Hedendaagse westerse consumptiepatronen worden geassocieerd met een reeks aan duurzaamheidsproblemen, zoals lucht- en watervervuiling, verlies van de biodiversiteit, dierenwelzijn en oneerlijke prijzen. Duurzaamheid is een concept met vele facetten en in de voedingscontext omvat het milieuaspecten, dierenwelzijnsaspecten en ethische werkomstandigheden (zoals eerlijke prijzen voor boeren). Technologische ontwikkelingen werden lang gezien als de oplossing voor duurzaamheidsproblemen rondom ons voedsel, maar recentelijk is er veel aandacht voor de rol van consumptie. Dit proefschrift draagt bij aan een beter begrip van duurzame voedselconsumptie en zal daarmee bijdragen aan een verschuiving naar een duurzamer voedingspatroon.

De doelstelling van dit onderzoek is het identificeren en leveren van inzichten in consumentensegmenten gebaseerd op voedingsleefstijlen en consumptie van duurzame voeding. Voor het onderzoeken van motieven en gedrag rondom duurzame voedselconsumptie is het van belang om de diversiteit in consumenten in beschouwing te nemen. Een manier om dit te doen, is het toepassen van consumentensegmentatie. Consumenten kunnen op vele manieren worden gesegmenteerd, maar in het proefschrift wordt gefocust op het belang van leefstijlsegmentatie. Leefstijlvariabelen zijn cruciaal om te begrijpen waarom consumenten zich gedragen zoals ze doen. Leefstijl biedt cognitieve inzichten in consumenten en is nauw verbonden met gedrag. Daarom zijn inzichten in leefstijlsegmenten nuttig bij het ontwikkelen van communicatiestrategieën. Dit proefschrift bestaat uit zeven hoofdstukken, die hieronder zullen worden beschreven.

Hoofdstuk 1, de algemene introductie, beschrijft de maatschappelijke, theoretische en methodologische context waarin dit proefschrift geplaatst moet worden. Het hoofdstuk geeft een overzicht van wat een duurzaam dieet inhoudt, en onderscheidt twee soorten duurzame consumptie. Allereerst kunnen consumenten producten selecteren die op een duurzame manier geproduceerd zijn, zoals biologische, Fair Trade of diervriendelijke producten. Ten tweede kunnen consumenten duurzame consumptiepatronen hebben die gekenmerkt worden door weinig dierlijke producten en veel plantaardige producten. De literatuur maakt duidelijk dat een reductie in de consumptie van vlees en zuivel prioriteit heeft in het bereiken van een duurzaam dieet. Daarnaast plaatst hoofdstuk 1 het onderzoek in een theoretische context door het bespreken van de “waarden-leefstijl-gedrag hiërarchie” en gerelateerde consumententheorieën. Daarnaast wordt in hoofdstuk 1 het belang besproken van het zorgvuldig selecteren van het niveau van specificiteit waarop (segmentatie-)variabelen worden geoperationaliseerd. Variabelen kunnen bijvoorbeeld op algemeen, domein-specifiek of product-specifiek niveau worden geoperationaliseerd. In de context van duurzame voedselconsumptie is het niveau van de productcategorie zeer relevant,

vanwege het belang om minder vlees en zuivel en meer plantaardige producten te gaan consumeren.

Een eerste vraag die beantwoord zou moeten worden in het onderzoeken van duurzame consumentensegmenten is of zulke segmenten überhaupt bestaan en hoe we consumentensegmenten gerelateerd aan duurzame voeding kunnen identificeren. Daarom geeft **hoofdstuk 2** een overzicht van de beschikbare literatuur over duurzame consumentensegmenten in het voedingsdomein. Dit hoofdstuk geeft inzicht in de typen variabelen die worden gebruikt om consumentensegmenten te identificeren en te beschrijven. De variabelen zijn gecategoriseerd in drie hiërarchische niveaus: persoonlijkheidskenmerken, voedings-gerelateerde leefstijl en gedrag. Daarnaast zijn inzichten verkregen in de kenmerken van drie belangrijke consumentensegmenten (groenen, potentiële groenen en niet-groenen). Deze segmenten onderscheiden zich van elkaar op alle drie hiërarchische niveaus. De bevindingen impliceren dat toekomstige segmentatiestudies moeten overwegen om variabelen op de drie hiërarchische niveaus mee te nemen, om een compleet beeld te krijgen van consumentensegmenten rondom duurzame voeding.

De volgende drie hoofdstukken beschrijven drie segmentatiestudies in het voedingsdomein waarin consumentensegmenten worden geïdentificeerd op het productcategorieniveau. **Hoofdstuk 3** onderzoekt verschillende typen duurzame voedingsgedragingen. Twee typen duurzame voedingsgedragingen zijn geïdentificeerd: duurzame productkeuzes (zoals diervriendelijke productvarianten) en vermindering van de consumptie van niet-duurzame productcategorieën (vlees en zuivel). Dit hoofdstuk laat zien dat deze twee typen duurzame voedingsgedragingen empirisch kunnen worden onderscheiden en dat er op basis van deze gedragingen vier consumentensegmenten kunnen worden geïdentificeerd: de niet-duurzame consumenten, verminderders, product-georiënteerde consumenten en duurzame consumenten. Voorspellende variabelen voor beide typen gedrag overlappen slechts deels. Dit hoofdstuk concludeert dat het van belang is om consumptievermindering en duurzame productkeuzes te onderscheiden omdat consumenten niet alleen *kwantitatief* verschillen in de mate van duurzame voedselconsumptie, maar ook *kwalitatief* van elkaar verschillen in het type duurzaam gedrag dat ze toepassen.

Hoewel het relevant is om inzichten te krijgen in het type en de mate van duurzame voedselconsumptie, is het begrijpen van het “waarom” van consumptie cruciaal in het beïnvloeden van duurzame voedselconsumptie. Daarom richt **hoofdstuk 4** zich op de motivaties van consumenten en wordt het belang van attributen op productcategorieniveau onderzocht. Er worden segmenten geïdentificeerd op basis van

de scores op het belang van een reeks duurzaamheidsattributen, aangevuld met smaak, prijs en gezondheid. De resultaten laten zien dat alle duurzaamheidsaspecten kunnen worden gecombineerd in één onderliggende duurzaamheidsfactor en dat smaak, prijs en gezondheid kunnen worden gecombineerd in een zelf-georiënteerde factor. Deze factoren moeten apart worden onderscheiden voor elk van de vier productcategorieën (vlees, zuivel, vis en groenten) om de beste fit te krijgen. Gebaseerd op deze factoren zijn er drie consumentensegmenten geïdentificeerd: zelf-georiënteerde, gemiddelde en (duurzaamheids)bewuste consumenten. Ook is de perceptie van synergie tussen gezondheid en duurzaamheid bestudeerd. De resultaten laten zien dat de gepercipieerde synergie verschilt tussen consumentensegmenten en het sterkst was voor bewuste consumenten. Deze gepercipieerde synergie kan gebruikt worden in het stimuleren van duurzame consumptie en is verder onderzocht in hoofdstuk 6.

Hoofdstuk 4 maakt duidelijk dat verschillen tussen productcategorieën relevant zijn in het bestuderen van duurzame voedingsleefstijlen. Daarom wordt in **hoofdstuk 5** ingezoomd op consumptievermindering binnen de minst duurzame productcategorie: vlees. Consumentensegmenten blijken te verschillen in hun vlees-gerelateerde leefstijlen, evenals in hun niveau van vleesconsumptie. Er zijn vijf consumentensegmenten geïdentificeerd: vleesminnaars, onbewuste flexitariërs, bewuste flexitariërs, dwangmatige vleeseters en potentiële flexitariërs. Deze segmenten verschillen niet alleen in hun vlees-gerelateerde normen, percepties en motivaties, maar ook in hun mate van vleesconsumptie. Het hoofdstuk concludeert dat flexitarisme een veelbelovende trend lijkt naar meer duurzame voedselconsumptie en dat segmenten verschillende benaderingen nodig hebben om ze te stimuleren hun vleesconsumptie te reduceren.

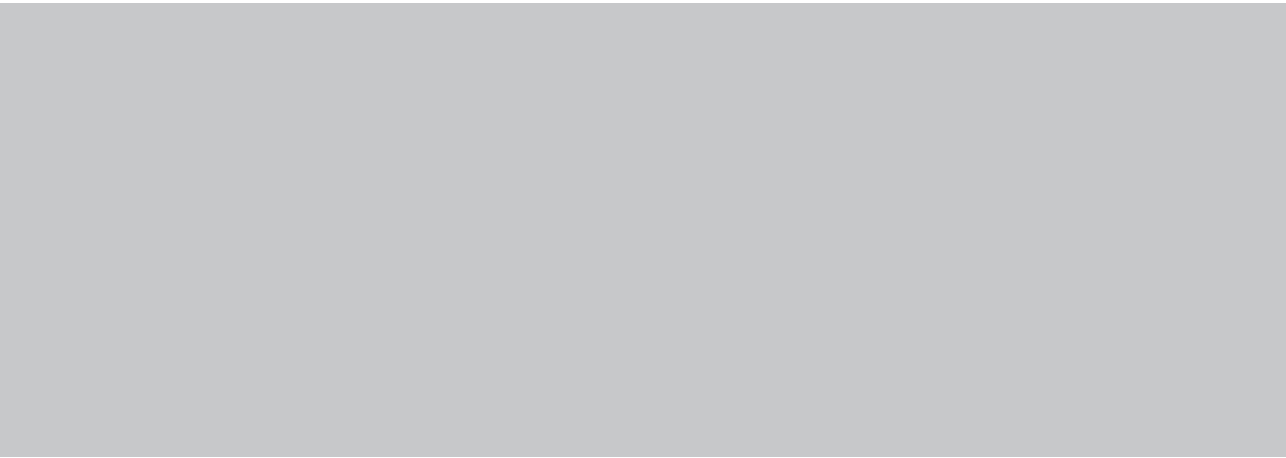
Hoofdstuk 6 gaat dieper in op de bevindingen van hoofdstuk 4. Dezelfde segmentatiebasis is gekozen, maar aanvullende persoonlijkheidskenmerken verbreden de inzichten in de geïdentificeerde segmenten. Daarnaast onderzoekt dit hoofdstuk verschillende communicatiestrategieën om de geïdentificeerde segmenten te benaderen met voedingsrichtlijnen die zowel bijdragen aan de gezondheid als de duurzaamheid van hedendaagse voedselpatronen. Er is een experiment uitgevoerd om te testen of de richtlijn om minder dierlijke en meer plantaardige producten te eten het best kan worden geframed als gezond, als duurzaam of als gezond én duurzaam. Voor alle segmenten is het aan te raden om gezondheids- en duurzaamheidsargumenten te combineren, maar het effect van zo'n boodschap verschilt tussen de segmenten. Een (positief) effect op intenties om duurzamer te eten wordt alleen gevonden voor het bewuste consumentensegment en alleen voor de productgroep 'vlees'. Daarmee geven de bevindingen aan dat het van belang is om voedingsboodschappen af te stemmen

op specifieke consumentensegmenten en dat er rekening moet worden gehouden met verschillen tussen productcategorieën.

In **hoofdstuk 7** worden de belangrijkste bevindingen en de implicaties daarvan besproken. Er kunnen verschillende belangrijke lessen geleerd worden uit de hoofdstukken van dit proefschrift:

- Duurzaamheid is een eendimensionaal begrip in de motieven, intenties en gedragingen van mensen.
- Op het gedragsniveau kunnen twee typen duurzame consumptie worden onderscheiden: vermindering en duurzame productkeuzes.
- Duurzame consumentensegmenten bestaan, maar andere voedselkeuzemotieven zijn ook voor deze consumenten van belang en kunnen niet genegeerd worden.
- Duurzaamheid kan gelinkt worden aan gezondheid.
- Leefstijl-segmenten hebben verschillende benaderingen nodig om hun eetpatronen te verschuiven naar duurzamere consumptieniveaus.
- Alle niveaus van de hiërarchie van constructen (persoonskenmerken, leefstijl en gedrag) zijn nuttig in het begrijpen van duurzame voedingssegmenten.
- Verschillen tussen productcategorieën in leefstijlvariabelen moeten in beschouwing worden genomen.

Concluderend biedt dit proefschrift zowel een theoretische als een praktische bijdrage, en zijn er nieuwe wegen geopend om voedingsgerelateerde consumentensegmenten te onderzoeken evenals manieren om voedingspatronen te verschuiven naar meer duurzame consumptieniveaus. De bevindingen van dit proefschrift bieden een goed startpunt om verder te onderzoeken hoe consumentensegmenten op het gebied van duurzame voeding het best kunnen worden geïdentificeerd en, meer specifiek, welke wegen bewandeld zouden moeten worden om duurzame voedselconsumptie te stimuleren in deze segmenten. Over het geheel genomen draagt het onderzoek dat in dit proefschrift is gepresenteerd bij aan een beter begrip van duurzame voedselconsumptie en ondersteunt daarmee een verschuiving naar duurzamere voedingspatronen.



About the author



About the author

Muriel Vérain grew up in Warmond, a little village near Leiden. In 2004 she moved to Wageningen to start with a Bachelors programme in Management, Economics and Consumer Studies. In her Masters programme, she further specialized in Consumer Studies. After her graduation in 2010 she started with a PhD-project with the Economics of Consumers and Households group. The project was a collaboration with the consumer research group of LEI. Since July 2014 Muriel is employed as a consumer researcher in the Consumer & Chain group at LEI-Wageningen UR.

Completed Training and Supervision Plan



Completed Training an Supervision Plan

Muriel C.D. Verain
 Wageningen School of Social Sciences (WASS)
 Completed Training and Supervision Plan



Name of the learning activity	Department/Institute	Year	ECTS*
A) Project related competences			
YRM-60306 Quantitative Data Analysis: Multivariate Techniques	WUR	2010	6
Sensory Perception and Food Preferences	VLAG	2011	1
Contemporary Agrifood Studies (PUREFOOD Advanced Scientific Skills Course)	WASS	2011	6
Theories in Environmental and Economic Psychology (Summer School)	STEPP – Aarhus University, Denmark	2012	5
EDEN Doctoral Seminar on Consumer Behaviour	EIASM – Brussels, Belgium	2012	5
B) General research related competences			
Project & Time management	WGS	2010	1.5
Techniques for Writing and Presenting a Scientific Paper	WGS	2011	1.2
WASS Introduction Course	WASS	2011	0.75
Research Methodology I: From topic to proposal	WASS	2011	4
‘Segments of Sustainable Food Consumers: A Literature Review’ (Conference Presentation)	ICSRC – University of Bonn, Germany	2011	1
Scientific Writing	Language Services WUR	2012	1.7
Voice Matters: Voice and Presentation Skills Training	WGS	2012	0.3

‘Segments of Healthy Food Consumers: A Literature Review’	IFHE – Melbourne, Australia	2012	1
‘Healthy and Sustainable Food Consumption: Terminology, Synergy and Actions from a Consumers’ Perspective’			
‘Sustainable Food Consumption: Act-related or Product-related Behaviour?’	IAREP – Wroclaw, Poland	2012	1
‘Sustainable Food Consumption: Act-related or Product-related Behaviour?’	WASS PhD-Day – Wageningen, The Netherlands	2013	1
‘Healthy and sustainable food consumption: attitudes, perceptions and behaviours’	10 th Biennial Conference on Environmental Psychology – Magdeburg, Germany	2013	1
‘Flexitarianism: A range of sustainable food styles’	ICAP – Paris, France	2014	1
C) Career related competences and personal development			
WASS PhD Council	WASS	2010-2012	7
Supervision PDQ-23306 (3x)	PDQ, WUR	2010, 2012, 2013	2
Writing Grant Proposals	Wageningen in’to Languages	2013	2
Career Orientation	WGS	2013	1.5
Total			50.95

*One credit according to ECTS is on average equivalent to 28 hours of study load

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