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REVIEW PAPER

Meeting Heterogeneity in Consumer Demand for Animal Welfare: A Reflection on Existing Knowledge and Implications for the Meat Sector

Janneke de Jonge · Hans C. M. van Trijp

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Abstract The legitimacy of the dominant intensive meat production system with respect to the issue of animal welfare is increasingly being questioned by stakeholders across the meat supply chain. The current meat supply is highly undifferentiated, catering only for the extremes of morality concerns (i.e., conventional vs. organic meat products). However, a latent need for compromise products has been identified. That is, consumer differences exist regarding the trade-offs they make between different aspects associated with meat consumption. The heterogeneity in consumer demand could function as a starting point for market segmentation, targeting and positioning regarding animal welfare concepts that are differentiated in terms of animal welfare and price levels. Despite this, stakeholders in the meat supply chain seem to be trapped in the dominant business model focused on low cost prices. This paper aims to identify conflicting interests that stakeholders in the meat supply chain experience in order to increase understanding of why heterogeneous consumer preferences are not met by a more differentiated supply of meat products produced at different levels of animal welfare standards. In addition, characteristics of the supply chain that contribute to the existence of high exit barriers and difficulty to shift to more animal-friendly production systems are identified. Following the analysis of conflicting interests among stakeholders and factors that contribute to difficulty to transform the existing dominant regime, different routes are discussed that may help and motivate stakeholders to overcome these barriers and stimulate the creation of new markets.

Keywords Animal welfare standards · Meat supply chain · Consumers · Ambivalence · System lock-in · Social dilemma theory · Europe

J. de Jonge (✉) · H. C. M. van Trijp
Marketing and Consumer Behaviour Group, Wageningen University and Research Center, Wageningen, The Netherlands
e-mail: Janneke.dejonge@wur.nl

Introduction

The meat sector is of great economic importance to the EU, and to the national economies of individual Member States (European Commission 2011). However, conventional intensive livestock production systems are characterized by negative externalities for the environment (e.g., greenhouse gas emissions) and animal welfare (Bessei 2006; Lesschen et al. 2011; Wischner et al. 2009). Increasingly, consumers and stakeholders in the meat supply value chain question the legitimacy of the dominant production system, which is guided by a strong focus on the instrumental value of farm animals (i.e., the value of animals for others as production means), and less attention to their intrinsic value (i.e., the value in their own right as sentient beings, whose integrity should be protected) (Kauppinen et al. 2010).

Over the last decades, a dichotomy in meat supply has developed. The smaller branch of the dichotomy consists of a niche market for meat produced at beyond regulatory standards for animal welfare (in the following "animal welfare enhanced meat") and meat substitute products to meet consumer needs at the "upper extreme" of the animal welfare continuum (Vanhonacker and Verbeke 2009). Beyond regulatory animal welfare standards are applied in different production systems, of which organic livestock production systems might be the most well-known and most generic.[1] In the Netherlands, the price premium for organic meat ranged from 54 % (beef) to 218 % (poultry) (Stichting Varkens in Nood 2009, p. 13). The larger branch of the dichotomy, with a market share of more than 94 % (Ministry of Economic Affairs, Agriculture and Innovation 2011) consists of meat products that originate from conventional production systems, and these efficiency-focused production systems continue to lead the meat sector. Commoditized meat products can be considered as the "lower extreme" regarding animal welfare, produced relatively inexpensively by adhering to minimum levels set for animal welfare in legislation.

The dichotomy in meat supply offers consumers limited trade-off possibilities between animal welfare and price. As a result, many consumers experience a tension when making purchase decisions regarding meat, being dissatisfied about animal welfare in conventional production systems and simultaneously not being able or willing to pay the high price-premium for animal welfare enhanced meat products from organic livestock systems. Based on consumer dissatisfaction with the current meat assortment in terms of animal welfare levels, a latent consumer need for "compromise products" has been identified, which can be characterized as conventionally produced meat products with added-value features, such as animal welfare (McEachern and Schröder 2002). However, stakeholders in the meat supply

[1] In most countries, organic livestock production systems provide the highest welfare levels for farm animals (Tuyttens et al. 2008; Veissier et al. 2008). The natural needs of animals are more central compared to other production systems, and animals' integrity is better protected (Lund 2006). Organic production systems differ from other production systems regarding stricter requirements on housing, which includes outdoor access, indoor space, environmental enrichment, group housing (pigs), as well as requirements regarding GMO-free feed, slaughter age, breed, restricted use of medical drugs, slaughter method, and protection of animals' integrity (no tail docking and teeth clipping (pigs), or beak trimming (laying hens)) (Lund 2006; Vaarst and Alrøe 2012).

chain tend to experience high barriers to transform their conventional, commoditized meat production systems into systems with improved animal welfare, resulting in stakeholder adherence to the status quo situation. We will refer to this tendency as system lock-in (Foxon 2007).

The current paper aims to increase understanding of the discrepancy between market supply (limited product differentiation) and consumer demand of meat products (increased product differentiation). That is, this paper aims to increase insight into why the majority of the meat is still produced in input-efficiency focused production systems and why heterogeneity in consumer demand is not met by a more differentiated supply in terms of the level of animal welfare standards applied in production systems. Hereto, the range of different interests involved with the choice for a particular production system with implications for animal welfare is analyzed for different stakeholders in the meat supply chain. Several papers have looked at the perspective of specific stakeholders on contemporary animal production systems (Bartels et al. 2011; Bock and Van Huik 2007; Bracke et al. 2005; Te Velde et al. 2002). In the current paper, these studies are integrated and reflected on and include the perspective of consumers, farmers and retailers. The theoretical framework of social dilemma theory is applied to analyze how short and long term interests, as well as self-interests and collective interests, create conflicts (Messick and McClintock 1968; Van Lange et al. 1992). In addition to conflicting interests at the stakeholder level, characteristics of the meat supply value chain will be discussed that contribute to system lock-in hindering transition towards more animal-friendly production systems. Following the analysis of conflicting interests among stakeholders and factors that contribute to system lock-in, it is addressed how dominant animal production systems might develop towards the existence of multiple systems that are more diversified in terms of animal welfare standards that are applied and that have the potential to create new markets and meet latent consumer demands for welfare enhanced meat products. So after zooming in on the interests of individual stakeholders, we zoom out and reflect on the bigger picture, and identify routes to strengthen stakeholder and consumer commitment to produce, sell and consume welfare enhanced meat.

The paper focuses on investigating how negative externalities of livestock production systems can be better dealt with, given that global demand for animal proteins will increase the next decades (Godfray et al. 2010). We realize that from the perspective of animal welfare and ecological sustainability, a drastic reduction of meat production and consumption is the most desirable solution to reduce the negative externalities of the livestock sector (De Bakker and Dagevos 2011). Whereas a small segment of the population believes that animals should not be reared for their meat (or anything else they "produce," such as eggs or fur), the majority of the consumers wish to continue eating meat on a regular basis (Povey et al. 2001). Given this situation, this paper addresses how meat can be produced in a way that reduces the negative externalities of dominant livestock production systems.

Decisions about whether to produce and consume meat from production systems applying higher animal welfare standards are not independent from other considerations, such as the ecological impact of meat production (Siegford et al. 2008). For example, the implementation of measures to improve animal welfare can

simultaneously increase greenhouse gas emissions (Halberg et al. 2010; Leinonen et al. 2012). Development of (private) standards, certification, and on-package labeling of the level of animal welfare standards throughout the production process are in a more advanced stage than certification and on-package labeling of the environmental impact of meat production. In addition, and possibly as a consequence of this, meat consumption decisions seem to be more strongly driven by animal welfare issues compared to environmental issues (Berndsen and Van der Pligt 2004; Povey et al. 2001). The current paper therefore focuses on the role of animal welfare in consumer and stakeholder attitudes and decision-making regarding meat production and consumption.

The focus of the paper is on the European market, because a large part of the empirical work on the role of animal welfare in production and consumption is being conducted in Europe, and Europe is a forerunner in the area of animal welfare, both in terms of public policy and development of private standards regarding animal welfare (Veissier et al. 2008). It is, however, recognized that much of what is being discussed might be applicable to other countries or regions as well (in the near future).

The European Livestock Production Sector

The European Union (EU) is a major producer of meat in global terms, accounting for 22 % of worldwide pork production and 13 % of beef/veal and poultry production (European Commission 2011, p. 217 and 317; Lesschen et al. 2011). Their exports accounting for 9 % of the world trade in meat, the EU is a big player in meat trading (European Commission 2011, p. 217). In addition to the great economic importance of the meat sector to the EU, the self-sufficiency of the EU is vital for the political independence of its Member States.

The strong position of the European meat sector is due to the highly optimized and integrated supply chains, characterized by a high productivity per unit of labor, capital, and land (Meerburg et al. 2009). The optimization process started after World War II, when there was a strong focus on production to feed the population. Production systems were designed to produce a kilogram of meat with the lowest possible input (e.g., feed) at a low cost price. The result of this optimization process was that producers were able to produce meat with homogeneous quality and high safety levels (Grunert 2005; Naylor et al. 2005), that was available at a very reasonable price. The high production rates of animal products, and associated low prices and margins, forced farmers to further increase the efficiency of their operations. This process involved an increase in the number of animals per farm, the development of breeding programs to create genetic improvements of farm animals that were more profitable (e.g., fast food conversion and growth rate), and inside housing of animals to limit loss of energy (less infection, temperature control, emission minimalization). Currently, the majority of farmers still work according to this business model, and the process of scaling-up and increased concentration of animals, that is the increase in the number of animals in one location, is still going on (Statistics Netherlands 2009).

Negative Externalities

Despite being valued for their production efficiency and contribution to the EU and Member States' economy, livestock production systems are increasingly evaluated beyond traditional economic considerations to include the externalities that they cause, particularly in terms of their impact on the environment and animal welfare.

The European agriculture sector accounts for 9.2 % of total EU-27 greenhouse gas (GHG) emissions, e.g., methane, carbon dioxide, and nitrous oxide (European Commission 2009). Relative to other agricultural sectors, the livestock sector produces most GHG emissions (Deckers 2010). Besides GHG emissions, nitrates, phosphates, ammonia, the use of pesticides, soil erosion, and loss of biodiversity are negative externalities of livestock production systems (De Vries and De Boer 2010; Lesschen et al. 2011). The production of animal proteins requires a lot of resources, such as land, water, fossil fuels, and crops for animal feed. The conversion of grains and other crops into meat is relatively inefficient, resulting in higher environmental costs of meat compared to plant-based foods (Baroni et al. 2007; Reijnders and Soret 2003). When resources are used to fulfill the growing global demand for animal proteins, particularly from Asia and developing countries, this puts pressure on local and global eco-systems and threatens food security of the 9 billion world population in 2050.

In the input optimization process and focus on efficiency in production, the instrumental value of farm animals rather than their intrinsic value has been the center of attention (Kauppinen et al. 2010). In conventional intensive production systems, the integrity of animals is often harmed by castration, tail docking, and beak trimming. In addition, animals are often restricted in their ability to move freely and to display natural behaviors such as dust bathing and nest building, although these are considered important for their welfare (Bayram and Ozkan 2010; Bracke and Spoolder 2011; Shields et al. 2004; Wischner et al. 2009).

At the European level, and within its member states, the issue of animal welfare has received increased attention over the past decades. Farm animals are recognized as sentient beings that deserve protection, and legislation sets minimum requirements in order to spare animals from any unnecessary suffering in the areas of farming, transport and slaughter. Article 13 of the Treaty of Lisbon (Treaty on the Functioning of the European Union) states that "in formulating and implementing the Union's agriculture, […], the Union and the Member States shall, since animals are sentient beings, pay full regard to the welfare requirements of animals". However, despite these guarantees on basic levels of animal welfare, the legitimacy of the dominant intensive meat production system is increasingly being questioned by stakeholders across the meat supply value chain (European Commission 2007a; Fulponi 2006; Te Velde et al. 2002). This is particularly evident as a societal response when consumers associate meat with "unethical food" (Mäkiniemi et al. 2011), in particular the belief that it is wrong animals have limited space and are restricted in their behavioural freedom (Te Velde et al. 2002; Vanhonacker et al. 2009). It has been suggested that meat consumption is in an early stage of moralization, in which the choice to consume meat converts from a morally-neutral decision (i.e., an outing of personal preference) to a moral decision (i.e., an outing of values) (Rozin et al. 1997).

The Consumer Market: Evidence for Heterogeneous Demand for Animal Welfare Enhanced Meat Products

A large scale public opinion survey has shown that 77 % of European consumers believe that the welfare-protection of farm animals needs to be improved (European Commission 2007a). Despite the overall tendency of increased interest in and concern about farm animal welfare, however, several studies have shown that consumer opinions about farm animal welfare and livestock breeding more generally, as well as their consumption decisions, differ considerably between individuals.

Often, surveys are used to investigate consumer opinions (European Commission 2007a; Frewer et al. 2005; Verbeke and Viaene 2000). Although surveys provide relevant information about how consumers feel about a particular issue (Grunert 2006), voiced concerns are often only weakly related to actual (purchase) behaviors (Auger and Devinney 2007). This is because when making purchase decisions, consumers need to make a trade-off between different product attributes (e.g., price, taste, health, animal welfare). Despite concerns about animal welfare, consumers might choose for meat produced in a conventional production system, because price is weighted more heavily in the decision-making process. Several methods have been developed in order to more accurately predict the relative importance of attributes in judgment and choice (i.e., in actual consumer decision making) (Van Ittersum et al. 2007). What these methods have in common is that evaluative judgments are made in a more realistic setting where people have to evaluate products or situations that differ on multiple attributes, which forces them to make trade-offs between these attributes (Haaijer and Wedel 2007; Olynk et al. 2010). It should be noted that attitude-behavior discrepancies can never be completely eliminated when hypothetical situations are investigated (i.e., that do not involve the exchange of real meat products and money), and when the study is conducted in a laboratory or experimental setting (which is most often the case, for a variety of reasons). That is, in real-life, grocery shopping is often a time-pressed and information-overloaded situation, where several factors can function as a barrier to buy meat produced at beyond regulatory welfare standards. These barriers can be grouped into barriers linked to motivation (e.g., attitude accessibility, influenced by extent of information processing), opportunity (e.g., unavailability of the preferred product in the shop), and ability (e.g., sufficient resources, e.g., money) (Rothschild 1999). The following reflection on previous studies on consumer perceptions and preferences includes studies that focus on attribute *relevance* (i.e., the importance of animal welfare influenced by personal values) (Vanhonacker et al. 2007), as well as studies that assess the *determinance* of attributes (i.e., the importance of an attribute in decision-making) (Krystallis et al. 2009; Meuwissen et al. 2007).

Consumer Attitudes Toward Animal Welfare and Meat Consumption

Attitudes toward meat consumption and animal welfare are linked to people's value structures (Allen and Ng 2003; Allen et al. 2000; De Boer et al. 2007). For example, meat consumption was higher for people who more strongly endorsed inequality and hierarchy values (Allen and Ng 2003; Allen et al. 2000), and lower for people

who endorsed universalistic values (De Boer et al. 2007). Research has shown that consumers differ both with respect to the *intensity* (i.e., strength) and the *focus* (i.e., direction) of their concerns (Krystallis et al. 2009; Meuwissen et al. 2007; Te Velde et al. 2002; Vanhonacker and Verbeke 2009; Vanhonacker et al. 2007, 2009). For example, Krystallis et al. (2009) found that consumers in two out of four identified segments strongly rejected slatted floors and were strongly in favor of animals (pigs) having outdoor access, whereas in the two remaining segments consumer preferences regarding these aspects were much less pronounced, indicating a lower intensity of concern. In addition, differences between segments were found regarding the focus of concerns in that two segments attached highest importance to animal welfare (i.e., housing and floor type), one segment of consumers attached the most importance to efforts to protect soil, air and water, and one segment attached low to moderate importance to both animal welfare and environmental aspects of production systems (Krystallis et al. 2009). Several studies have shown that at least three distinct consumer groups can be identified on the basis of their perceptions about animal welfare and their meat consumption patterns (Krystallis et al. 2009; Meuwissen et al. 2007; Vanhonacker et al. 2007).

Consumers Who Are Concerned About Negative Externalities of Meat Production and Consumption

Vanhonacker et al. (2007) distinguished between six segments of consumers on the basis of the perceived importance of animal welfare in purchase decisions relative to other product attributes, as well as the perceived current state of animal welfare in livestock production. Animal welfare was rated as the most important attribute in one of the segments (11 % of the sample), and consumers in this segment rated current livestock production systems as very problematic. Consumers in this segment showed a higher willingness to pay for welfare enhanced products compared with other segments, and the rate of vegetarianism and consumers who eat meat very occasionally was relatively high (62 %). These results are in line with the study by Krystallis et al. (2009) who found that pork consumption was lowest among the segments who attached relatively high importance to animal housing. Of course, non-moral arguments related to health and safety concerns (e.g., microbiological risks, bone meal in pig feed), as well as taste preferences do also play a role in choosing welfare enhanced meat products (De bakker and Dagevos 2011; Meuwissen et al. 2007; Vanhonacker and Verbeke 2009). For example, Meuwissen et al. (2007) identified a segment of health concerned consumers, related to both human and animal health, as well as a segment of consumers that was mainly driven by price and taste attributes (see also below). Both segments tended to consume pork frequently, but the health concerned segment was more likely to buy organic pork meat.

Consumers Who Do Not Perceive Current Livestock Systems as Problematic

Besides consumers who attach high importance to welfare issues in animal farming, there are consumers who do not attach much importance to animal welfare and who do

not perceive current livestock systems as problematic (Meuwissen et al. 2007; Vanhonacker and Verbeke 2009; Vanhonacker et al. 2007). Both Meuwissen et al. (2007) and Vanhonacker et al. (2007) identified a total of six segments. One of these segments consisted of consumers who were more hedonically oriented and attached high importance to taste, quality and freshness. Meuwissen et al. (2007) found that, in contrast to other segments, this segment was in favor of tail docking, teeth clipping and castration of boar. In addition, consumers in this segment favored low prices (Meuwissen et al. 2007), had a low willingness to pay for welfare-enhanced meat products, and tended to have the highest consumption level of meat (Meuwissen et al. 2007; Vanhonacker et al. 2007). Vanhonacker and Verbeke (2009) split up consumers into different groups on the basis of their self-reported buying frequency of welfare enhanced chicken meat. Consumers who never bought chicken meat that had been produced with extra care for animal welfare, evaluated animal welfare as important to them, but simultaneously evaluated the current welfare condition of chickens in livestock production systems as good. In their purchase behavior of animal products, these consumers were mostly driven by taste, quality and health considerations. Ethical aspects were considered least important. Price (too high) and availability (too low) were seen as the main barriers to purchasing welfare enhanced chicken meat. In terms of willingness to pay, only marginal increases of five percent in the price level were acceptable to these consumers.

Consumers Who Are Moderately Concerned About Animal Welfare

Although some consumers highly value animal welfare, and others do not attach much importance to animal welfare, the majority of the consumers fall between these two extremes (Meuwissen et al. 2007; Vanhonacker et al. 2007). For example, Vanhonacker et al. (2007) identified four middle segments, consisting in total of more than 75 % of the sample, that were to some degree concerned about animal welfare. Two of these segments can be considered middle segments at the lower end of the market. They attached more importance to animal welfare and evaluated current livestock systems more negatively than the hedonically oriented segment (see above), but they consumed the same amount of meat and only showed limited willingness to pay for animal welfare. Despite expressed concerns, these consumers might feel they have no realistic action perspective to deal with their concerns, since they are not able or not willing to pay the high price premium for welfare-certified meat. The other two middle segments can be considered middle segments at the higher end of the market. Consumers in these segments were more dissatisfied with how animal welfare is dealt with in current livestock systems compared to the lower-end middle segments, and they believed that product labels should more clearly indicate rearing conditions. In addition, these consumers consumed less meat, and indicated they were willing to pay more for animal welfare enhanced meat.

Ambivalence

Besides differences *between* individuals, individual consumers can also experience conflicting beliefs about meat consumption *within themselves*. When positive and

negative beliefs about meat consumption co-exist, people are said to have an ambivalent attitude (Berndsen and Van der Pligt 2004; Povey et al. 2001; Te Velde et al. 2002). Povey et al. (2001) has shown that meat eaters experience considerable ambivalence toward a diet including meat products. The experienced ambivalence particularly stemmed from a discrepancy between positive beliefs related to hedonic preferences (taste), the nutritionally balanced value of meat and the high variety of choice, and negative beliefs related to concerns about health aspects of meat products (fattening, health scares). Moreover, meat eaters were found to be more ambivalent towards their meat diet than other dietary groups were about their diet. That is, vegetarians and vegans had less ambivalent attitudes toward vegetarian and vegan diets, respectively. Berndsen and Van der Pligt (2004) similarly found that a substantive part of the respondents experienced conflict, indecision, and mixed reactions towards the issue of meat consumption. People who were more ambivalent more strongly perceived that eating meat is not morally sound and that killing animals for consumption is not justified. Ambivalent individuals also felt more negative affect related to meat. They worried more about the safety of meat, they felt more guilt and shame in relation to eating meat, and eating meat caused more anxiety in these individuals. Higher levels of ambivalence were further found to be negatively related to meat attitudes (Berndsen and Van der Pligt 2004), and to weaken the positive relationship between attitudes toward meat and intentions to eat meat in the future (Povey et al. 2001). Also, people with a high level of ambivalence tended to consume meat less often, or consumed smaller amounts of meat (Berndsen and Van der Pligt 2004).

There is also evidence for consumer ambivalence about the type of meat to consume. For example, consumers were ambivalent about the state of animal welfare in intensive livestock production systems (Te Velde et al. 2002). On one hand they believed that farmers would surely treat their animals well, but they simultaneously worried about the lack of space farm animals had. Conflicting beliefs about current livestock systems might be explained by the tendency of consumers to be increasingly detached from animal production, and have limited insight into how farm animals are raised (Berndsen and Van der Pligt 2004; Hoogland et al. 2005). Consumers also indicated they experienced ambivalence in making meat choice decisions. For example, McEachern and Schröder (2002) found that, although consumers were positive about animal welfare and environmental aspects of organically produced meat, they believed it was too expensive, which was the main barrier for not consuming it.

Consumers in the middle segments (see Meuwissen et al. 2007; Vanhonacker et al. 2007; Vanhonacker and Verbeke 2009) might experience the strongest level of ambivalence and conflicts of interest regarding different meat attributes, because they may care but may not be able or willing to make the necessary sacrifices for welfare enhanced meat (e.g., price sensitive consumers). That is, choosing conventional products might be the consequence of price barriers or lack of availability of meat produced at beyond regulatory animal welfare standards (McEachern and Schröder 2002; Vanhonacker and Verbeke 2009). Consumers in the lower and higher extreme of the meat market, on the other hand, might experience relatively modest conflicts of interest and ambivalence with respect to

their consumption pattern, because they are either uninterested in further improvements of farm animal welfare, or they have found a way to deal with their concerns through reduced consumption of meat and/or consuming meat products originating from production systems with higher animal welfare standards (e.g., organic products).

Product Differentiation

The dominant production system, characterized by a relatively undifferentiated supply, particularly caters to the extremes of the animal welfare continuum (i.e., conventional vs. organic meat). However, we have seen that, like other consumer markets, the market for meat products is highly segmented where distinct consumer groups with specific needs and preferences can be identified. Moreover, considering that many consumers experience ambivalence regarding meat consumption, many consumers might feel that the current supply of meat products does not enable them to make trade-offs between meat attributes in a way that feels right for them. That is, the current meat supply might be insufficiently able to meet or respond to latent consumer concerns regarding animal welfare issues and fulfill latent consumer demand for animal welfare enhanced products. Therefore, there is a need for products that better meet the different needs of consumers and that reconcile positive and negative aspects of meat through seeking compromises between different attributes. In particular, there is a need for products that represent the "golden mean," which are produced at above regulatory levels of animal welfare and offered at an acceptable price (McEachern and Schröder 2002). Such a differentiated supply, where a broader range of trade-offs is created between above-legal levels of animal welfare standards and price levels, enables consumers, particularly those in the middle segments, to make choices that fit with their specific needs and preferences, and might reduce ambivalence regarding meat consumption.

Stakeholder Ambivalence: A Social Dilemma Perspective

Despite heterogeneous consumer demand, stakeholders experience difficulty in escaping the strong focus on low production costs. The market share of conventional meat and eggs in the Netherlands was more than 94 % in 2010 (Ministry of Economic Affairs, Agriculture and Innovation 2011), which shows that the bulk of these products are still produced in conventional livestock production systems, and that the market for welfare enhanced meat and eggs still represents a niche market. In order to identify routes to shift the focus of the dominant production system towards the development of new differentiated markets, it is crucial to understand the trade-offs stakeholders in the meat supply chain are confronted with, and the factors that contribute to the high exit barriers and system lock-in.

Stakeholders involved in the meat sector are, like many consumers, ambivalent regarding meat production (Bartels et al. 2011; Bracke et al. 2005; Te Velde et al. 2002; Wilkie, 2010). Clearly, producing and killing sentient animals for the purpose of food creates a complexity that does not exist with the production of non-sentient

goods (see Wilkie 2010 for an extensive and detailed overview of how people in different stages of the livestock value chain interact with and disengage from the animals they work with). Stakeholders, on the one hand, want to hold on to the optimization paradigm that characterizes the current, intensive, and highly efficient meat production chain. On the other hand, stakeholders feel the moral obligation and social pressure to improve farm animal welfare (Bock and van Huik 2007; Kauppinen et al. 2010; Te Velde et al. 2002). Conflicting interests regarding animal welfare are strongly linked to the discrepancy between economic versus moral interests (Bracke et al. 2005). Economic interests particularly serve short term self-interest, whereas moral interests particularly serve longer term collective interests. The conflict between these short term self-interests and longer term collective interests is the core of social dilemma theory (e.g., Messick and McClintock 1968; Van Lange et al. 1992). Since there are also self-interests that have a long term focus, e.g., maintaining a viable business, and collective interests with a short term focus, such as curative treatment of animals with antibiotics, we explicitly make a distinction between self and collective interests, as well as short and long term interests. In our conceptualization of the social dilemma that stakeholders face, we explicitly consider the collective to include both humans and animals, which is in line with the current perspective of the European Commission on animal welfare, which takes the recognition that animals are sentient beings as a starting point for their activities (European Commission 2007b). So, when presented with a choice between lower or higher animal welfare standards, stakeholders are faced with two basic underlying conflicts of interest: (1) a social conflict between individual and collective interests, for example the producer conflict between generating income and the level of animal welfare in their production system, and (2) a temporal conflict between short and long term interests, for example the producer conflict between further optimization of their production system and maintaining a viable business in the long run. Animal welfare might be best described as a social (delayed) fence (Platt 1973), where behaviors with immediate negative consequences for the self (e.g., investment in more animal-friendly housing systems) result in long-term positive consequences for the self and others (e.g., license to produce and improved animal welfare conditions).

The perspective of farmers and retailers as important stakeholders in the meat supply chain is addressed. Conflicts of interest with respect to animal welfare in other parts of the meat supply chain are not well documented in the literature. In addition, the influence of the macro environment of the meat supply chain, including government and special interest groups, on how the social dilemma is experienced by actors in the chain is discussed. Within Europe, country differences exist regarding animal welfare issues, such as degree of media attention, policy arrangements, and legislation (Bock and van Huik 2007; Veissier et al. 2008). However, the nature of the dilemmas that are experienced by stakeholders is comparable between European countries (Fulponi 2006; Kauppinen et al. 2010; Te Velde et al. 2002). Therefore, differences between countries are not explicitly considered in the following overview of stakeholder interests. An overview of the multitude of interests of different stakeholders, including consumers, is presented in Table 1.

Table 1 Overview of stakeholder interests

Stakeholder	Economic interests		Moral interests	
	Self-interest short term	Self-interest long term	Collective interest short term	Collective interest long term
Consumers	Hedonic preferences (taste)	Healthy nutrition (nutritional value, fattening, food safety risks)		Animal welfare (respect for animals, animal space)
	Convenience (availability, preparation time)			Environment (needs of future generations)
	Price			
	High variety of choice			
Farmers	Making a living	Viable business	Animal health (e.g., mastitis)	Animal welfare
	Good technical performance of the system (reproduction parameters and animal health)	Good market access		Animal health
	Product quality	Anticipate new legislation		Recognize intrinsic value of farm animals (sentient beings, integrity and subject value), give animals the opportunity to display natural behaviors
	Food safety			Public health (e.g., related to use of antibiotics by farmers)
	Working enjoyment			Environmental effects
	Good working conditions			
	Recapturing license to produce			
	Reduction of uncertainty			

Table 1 continued

Stakeholder	Economic interests		Moral interests	
	Self-interest short term	Self-interest long term	Collective interest short term	Collective interest long term
Retailers	Satisfying consumer expressed needs (prevent loss of customers)	Viable business (based on quantity sold and profit margins)		Social responsibility to sell animal welfare enhanced products
	Good reputation	Satisfying consumer latent needs		Social responsibility to stimulate sustainable consumption in general
		Distinguish from competitors to create competitive advantage		
		Anticipate new legislation (or even influence changes in legislation), e.g., through standards development		
Socio-cultural environment: special interest groups (ngos)	Good publicity	Satisfying expectations of members	Taking action on current issues	Increase animal welfare in livestock farming
		Making progress on achieving main goal		
Political environment: government	Balance interests of other stakeholders	Performance national economy		Animal welfare
		Adapt to international developments		Public health
				Environment

Supply Chain Actors

Farmers

Livestock farming systems are complex, and producers need to take a large number of aspects into account in their operations, such as economic performance, the quality of their product, food safety, animal welfare, environmental impact, but also farmers' working enjoyment and good working conditions (Bock and van Huik 2007; Kauppinen et al. 2010; Te Velde et al. 2002).

Farmers experience multiple conflicts of interest. The first is the conflict between short-term and long-term economic goals. From a long-term economic perspective there are several arguments in favor of implementing animal welfare improvements. First, animal welfare improvements can lead to improved market access when demands from buyers, such as retailers, become stricter (Bock and Van Huik 2007), or when animal welfare laws are tightened. In addition, animal welfare measures can (in the short term) enhance production or deliver added value of products (Bracke et al. 2005). In particular, the welfare dimension "animal health" can be positively linked to production efficiency. For example, cleansing milking equipment after a cow with clinical mastitis has been milked prevents new cases of clinical mastitis. The financial advantages of this measure exceed the costs, and animal welfare is simultaneously improved (Hogeveen et al. 2011). However, against these advantages, farmers also perceive substantive uncertainties associated with increasing the welfare of their animals, which makes them reluctant to do so. That is, animal welfare improvements beyond those that increase productivity, were perceived by farmers as posing major economic risk, which can pose a threat to the continuity of farmers' businesses (Bock and Van Huik 2007; Bracke et al. 2005; Te Velde et al. 2002). Farmers expressed uncertainty about consumer willingness to pay for meat produced at higher welfare standards. In addition, they distrusted retailers, because these were expected not to be willing to pay a price that would cover the higher costs of implementing higher animal welfare standards (Bock and Van Huik 2007). Further, the imbalance between national legislation and legislation abroad was perceived by farmers to negatively affect their competitive position. In this context, retailers were accused of maintaining double standards by demanding high standards for domestic products, but simultaneously importing cheap meat produced under lower standards (Bock and Van Huik 2007). Finally, some welfare measures were perceived to be detrimental to animals' health, which would negatively affect economic performance as well as animal welfare (Bock and Van Huik 2007).

The second conflict of interest is the conflict between short-term economic goals and moral arguments in favor of implementing higher animal welfare standards. With respect to moral interests, the focus is on the intrinsic value of farm animals, which refers to respecting animals as sentient beings, and to acknowledging their integrity and subject value (i.e., their psychological abilities and their striving after things) (Bock and Van Huik 2007; Kauppinen et al. 2010; Te Velde et al. 2002). Farmers who attach high importance to the intrinsic value of farm animals consider improving animal welfare as a universal duty in human action (Kauppinen et al. 2010).

Conflicting beliefs about farmers' production systems typically result from the discrepancy between economic interests (i.e., making a good living) and recognizing the intrinsic value of farm animals. For example, welfare measures that allow animals to have pasture time cause a lower efficiency of the conversion of energy to meat, and therefore higher production costs, because animals need more energy to maintain their temperature and fight infections. In addition, cleansing milking equipment after milking cows with mastitis for *both* clinical *and* subclinical cases, improves animal welfare through animal health, but financially the costs exceed the benefits (Hogeveen et al. 2011). Research has shown that such welfare measures, which do not result in economic benefits, were met with skepticism and resistance from producers (Bracke et al. 2005). Further, giving more consideration to animal welfare was associated by farmers with returning to more traditional ways of farming with worse working conditions (Te Velde et al. 2002). It appears that short-term economic interests in many cases outweigh long-term economic and moral interests. Some producers go as far to state that although animals should be treated in a good way, animal welfare is related to economic consequences and that one should be careful with anthropomorphism (Vanhonacker et al. 2012), which is the (to some extent perceived ungrounded) attribution of human characteristics, such as feelings, motives and intentions to non-human entities (Busch 2011; Grossman and Simon 1969). Indeed, many farmers look at animal welfare from an instrumental perspective, in the sense that they are particularly focused on the technical performance of their system in terms of (re)production parameters and animal health (Te Velde et al. 2002).

The core of the social dilemma that farmers experience is the conflict between short-term economic interests and the need for "guarantees" (i.e., a good price and a market for their products) on the one hand, and animal welfare improvements, particularly those related to the intrinsic value of farm animals, on the other hand. This conflict of interests directly relates to an important goal of farmers; recapturing their license to produce (Te Velde et al. 2002), which is increasingly under pressure due to societal concerns about animal welfare in livestock farming. Current optimized production systems, where animal welfare is accounted for as far as this is laid down in legislation or to the extent that it increases productivity, provide economic certainty in the short term, but simultaneously their legitimacy is increasingly under pressure, which poses a risk in the longer term when production systems would not evolve into more animal-friendly systems. It should be noted that the general production-related view on animal welfare among farmers and the dominance of economic interests holds for the majority of farmers. However, there are differences both between and within countries, where some farmers more strongly hold a production-related view on animal welfare, and others put the intrinsic value of animals more central. A discussion of these differences goes beyond the scope of this paper, but the interested reader is referred to Austin et al. (2005), Bock and van Huik (2007), Darnhofer et al. (2005), and Kauppinen et al. (2010).

Retailers

Retailers' view on welfare is derived from their relationship with producers as well as consumers. Due to their market power (i.e., there are relatively few retailers

compared to the large number of producers and consumers), retailers are ascribed a special responsibility in the development of more animal-friendly production and consumption (Bock and Van Huik 2007; Bracke et al. 2005). With respect to their economic interests, retailers experience a conflict between a short term customer orientation and a long term market orientation strategy. In addition, they experience a conflict between short-term economic goals and taking responsibility for collective interests.

A market oriented approach focuses on the longer term, on satisfying consumer latent needs, and on influencing events rather than reacting to them (Slater and Narver 1998). In such an approach, increasing animal welfare standards is motivated by economic benefits of engaging in socially responsible behaviors (Maignan and Ferrell 2004). First, retailers' economic interests might be served by using animal welfare to distinguish themselves from competitors and attract new customers by means of differentiation (Bartels et al. 2011; Ingenbleek and Frambach 2010). However, beyond profitability, setting stricter requirements for producers might serve to prevent losses, since there is a threat that consumers will penalize retailers and products that do not meet their ethical standards (Hughes 1995). In addition, retailers consider providing consumers with products that go beyond the minimum requirements as essential to building reputation (Fulponi 2006). Reputation is a key mediator of performance and comprises a range of different aspects that reflect how well a company fares in terms of, among others, asset use, financial soundness, community and environmental friendliness, degree of innovativeness, management quality, and product quality (Philippe and Durand 2011). Corporate Social Responsibility (CSR) is an important aspect of a company's reputation. It has been defined in the ISO 26000 guideline on social responsibility of organizations (ISO 2010) as integrating the responsibility of an organization for the impacts of its decisions and activities on society and the environment, through transparent and ethical behavior that contributes to sustainable development, throughout an organization's relationships (Hartmann 2011). At the supply chain level, social responsibility concepts are increasing in importance (Maloni and Brown 2006), including with respect to animal welfare, where an increase in private voluntary standards is being observed (Fulponi 2006). The development of standards where market demands are translated into specific product characteristics, might pro-actively be applied in anticipation of government rules or to actually influence changes in legislation (Fulponi 2006), and might result in competitive advantages (Nidumolu et al. 2009). There is evidence that a number of major retailers were in favor of harmonizing animal welfare standards, or at least seeking a common understanding on minimum levels of animal welfare (Fulponi 2006).

However, many retailers apply a customer orientation approach, in which they are guided by satisfying customers' expressed needs, rather than their latent needs (Narver and Slater 1990; Slater and Narver 1998). From the low market share of organic meat products, stakeholders tend to infer that consumers are not motivated to consume animal welfare enhanced meat (Bock and van Huik 2007). Chief executive officers (i.e., CEOs) from, among others, the retail sector indicated that the degree to which measures were taken to enhance sustainable production and consumption, such as animal welfare, was dependent upon the degree to which

customers showed an interest in these measures (Bartels et al. 2011). The customer-led philosophy is pragmatic and opportunistic in the sense that expected benefits in terms of short-term revenues rather than moral arguments determine policy with respect to assortment decisions. Offering high price discounts to promote sales and generate store traffic is another example of a customer-led approach, where consumer sensitivity to price discounts is used to legitimize selling commoditized meat from the conventional livestock industry at very low, and sometimes even negative, margins. Many retailers experience difficulty deviating from the focus on costs and fulfilling consumer expressed needs, rather than latent needs, for animal welfare enhanced products. Retailers feel they cannot change (e.g., by stopping to apply discount pricing strategies on conventional meat) unless other retailers do the same.

Economic and moral interests are not mutually exclusive, i.e., making the product assortment more animal-friendly can support both interests. However, they often have conflicting aspects. From a moral perspective, taking responsibility for the long-term interests of society (including animals) can be a fundamental part of the business philosophy (i.e., a social responsibility to stimulate sustainable consumption) and reflect the intrinsic values of an organization (Maignan and Ferrell 2004). The results from a survey among Dutch people working in the retail (79 % of the sample) and Out of Home sector (18 % of the sample) indicated that the majority (49 % agreement vs. 29 % disagreement) feel that their company should pro-actively take the initiative to make the product assortment more sustainable to speed up the process of sustainable consumption (Bartels et al. 2011, p. 27). In addition, 58 % of the interviewed people believed that consumers should be more actively seduced to buy more socially responsible products through offering them lower prices, more promotions and better availability of such products (21 % disagreement). However, there is also evidence that retailers feel reluctant to take such a pro-active position. More than one-third of the interviewees (34 %) believed that the demand for sustainable food products should be initiated by the consumer (47 % disagreed), and 46 % believed that externally communicating about sustainability too soon brings along a large risk for their reputation (27 % disagreed). Taking into account the fact that discount supermarkets were underrepresented in the sample and that "hard discounts" did not participate in the study (Bartels et al. 2011, p. 24), it can be expected that the opinions expressed in the survey are somewhat biased towards optimism about socially responsible consumption.

So, the social dilemma that retailers face is the conflict between using their market power to change the meat sector by *pro-actively* increasing animal welfare levels of the meat they sell and taking a *reactive* approach where stricter standards regarding animal welfare are only imposed when the benefits surpass the costs of doing this, or when they are forced to do this by law. It is the conflict between the need for change in response to changes in the environment (i.e., consumers, competitors, government, Non-Governmental Organizations (NGOs), and preserving stability (i.e., continue to use low-priced conventionally produced meat as a traffic generator). How this conflict is perceived and which actions follow from this in terms of working on sustainability issues and animal welfare in particular is not

the same for all retailers. Although economic motives are dominant for retailers, simply because they want to stay in business, there are differences between retailers regarding their customer orientation. On the basis of interviews with CEOs from the retail sector, the Out of Home sector, and the food industry (Bartels et al. 2011, p. 18), a general 20-60-20 division was observed regarding the degree of pro-activeness. That is, a relatively small group of 20 % can be considered trend setters with a pro-active view on sustainability (market-oriented philosophy), the majority of 60 % can be characterized as trend followers (customer-led philosophy), whereas the last 20 % do as little as possible.

The Macro Environment of the Meat Supply Chain

The macro environment of the meat supply chain has an important impact on how the social dilemma is experienced by actors in the chain, and sets boundary conditions on the trade-off between economic and moral interests. The macro environment refers to the socio-cultural (special interest groups and customers), political (regulators), technological and economic environment of actors in the food chain (Maignan and Ferrell 2004).

The socio-cultural environment, which is characterized by increased interest in animal welfare by consumers, special interest groups and the media, pressures actors in the meat chain to adopt increasingly higher animal welfare standards (Fulponi 2006; Ingenbleek and Immink 2010), and can even influence the financial performance of firms (Berman et al. 1999). Retailers considered the strength of special interest groups as an important determinant of the decision to adopt higher animal welfare standards, and most EU retailers reported that they have installed stricter animal welfare requirements than those of the national legislation (Fulponi 2006). There are several examples in the area of animal welfare where special interest groups were consulted or even fulfilled a central position in the development of animal welfare standards (Ingenbleek and Immink 2010). Special interest groups are organized around a single issue, and therefore conflicting economic and moral interests are less central. Since they are non-commercial entities they can take a more extreme position and focus on the moral aspects of intensive livestock farming. However, special interest groups have to balance between supporting improvements of animal welfare made by the sector, even though these might be incremental and might not come close to the desired objectives of the organization, and satisfying the expectations of their members, who might not want to "settle for less" than their ideals. Put differently, the challenge for special interest groups is to strive for their ideals and express their values, without pushing off farmers and retailers by demanding goals that are considered by chain members to be beyond reach. In the context of standard development, special interest groups should decide whether their position is strong enough to put their mark on the standard, or prefer an advisory role where they do not communicate their involvement to the public and can maintain a critical position toward the standard (Ingenbleek and Immink 2010).

In the political environment, animal welfare has received increased attention over the past decades (Veissier et al. 2008). Developments toward stricter legal standards and regulations regarding animal welfare create an incentive for producers to

increase the animal-friendliness of their operations in anticipation of new regulations. Although there is a tendency towards more strict regulations, it should be noted that the government—who is responsible for legislation—experiences conflicting interests themselves with respect to animal welfare legislation. That is, government has to balance its view on animal welfare by taking into account the economic interests of the meat sector, societal concerns about animal welfare expressed by citizens, scientific evidence on determinants of animal welfare, and the lobby from NGOs who believe that the current intensive livestock sector is unacceptable (Bracke et al. 2005). Although the European Commission (EC) supports international initiatives for animal protection, such as those from the Food and Agriculture Organization (FAO) and the World Organization for Animal Health (OIE), and there are efforts by the EC to promote animal welfare standards in trade arrangements, for example in WTO multilateral trade negotiations, initiatives to develop stricter animal welfare standards are left to the market. This is because the World Trade Organization (WTO) currently does not provide a framework that addresses farm animal welfare issues, and does not recognize animal welfare as a non-trade concern, which means that animal welfare concerns are not a legitimate reason to refuse imports of meat products from countries that apply lower animal welfare standards. It is feared by the sector that when stricter animal welfare standards are regionally enforced, for example in the EU, the competitive position of European producers on the world market will be impaired when regulations in the international community are not simultaneously sharpened. That is, with stricter EU regulations, European farmers might not be able to sell their products internationally and European retailers might be tempted to import cheaper meat products that are produced at lower animal welfare standards.

In addition to these key factors of the macro environment of the meat chain, the technological and economic environment play a role. The technological environment, which provides society with knowledge and technological solutions, might contribute to the design of production systems with higher welfare standards that are more feasible, due to enhanced insight into the determinants of animal welfare and ways how to assess these (Sejian et al. 2010; Temple et al. 2011). Finally, the economic environment, i.e., the economic climate, strongly influences the trade-off between economic and moral interests. Actors in the meat chain and consumers are more likely to commit themselves to, and support, animal welfare improvements, when the sector, and the national economy at large, is doing well (Bracke et al. 2005; Kauppinen et al. 2010).

System Lock-in

Although it is increasingly being recognized that the optimization production paradigm has contributed to poor animal welfare, the strong focus on efficiency and low cost prices continues to lead the meat sector. As a result of conflicting interests, many stakeholders experience a lack of motivation, opportunity, and/or ability to respond to their discomfort with current practices and improve upon their operations (Bartels et al. 2011; Bock and Van Huik 2007; Te Velde et al. 2002). We use the

term lock-into refer to the difficulty to transform the existing regime (Bos and Grin 2008). A general underlying cause of resistance to change is inertia (or status quo bias) (Thaler and Sunstein 2008, p. 34). Unless stakeholders take action, they will just stick to the current situation, not necessarily because they believe it is the best thing to do, but because it is what they have been doing for a long time. However, there are also specific characteristics of the meat supply chain and institutional constraints (e.g., economic rules) that contribute to system lock-in and hamper change and innovation. The first is the focus on optimization and efficiency itself (Kauppinen et al. 2010). In an infrastructure that has been optimized for bulk, creating separate product lines for animal welfare enhanced meat (for logistic reasons), for example in abattoirs, incurs high costs (Bracke et al. 2005). As long as animal welfare enhanced meat products remain a niche market, it is unlikely that dedicated chains that specialize in handling farm animals coming from production systems with beyond regulatory welfare requirements will develop, because the focus on efficiency at all levels of the chain makes it difficult to deviate from this paradigm.

Second, system lock-in results from the unequal attribution of the production costs to different parts of the slaughtered animal. Improved animal welfare conditions during animal rearing are only valued, in terms of a higher market price, in fresh meat (25 kg per finishing pig), and not in the market price for meat intended for further processing and secondary applications (54 kg per finishing pig) (Backus et al. 2012). This means that increased production costs per animal as a result of the implementation of beyond regulatory animal welfare measures at the primary producer level, all need to be attributed to fresh meat, which results in a disproportionate increase in the price of fresh meat. For example, when production costs increase with 5 euro, the price premium at the consumer level is minimally 20 cents per kg (5 euro/25 kg), assuming that all costs are passed on to the consumer, and the price (i.e., market value) of meat for processing remains the same. This situation creates a barrier to switch to more animal-friendly production systems when this leads to higher production costs, because it might result in substantive price increases that exceed what consumers are willing to pay. When meat for processing and secondary applications also has added value, being reflected in a higher market price, the implementation of animal welfare measures at the primary producer level is more attractive. For example, when the increased production costs of 5 euro can be attributed to all meat coming from the slaughtered pig, the price premium is only 6 cents per kg (5 euro/79 kg). When the increased production costs are attributed more equally to different parts of the slaughtered animal, the possibilities for the market introduction of welfare-enhanced meat products increase (Backus et al. 2012).

A third factor that causes system lock-in is related to producers' international competitive position. The European meat sector is a net-export market and produces for many countries. This means that they are not only dependent on preferences and needs expressed in the domestic market, but also on those expressed in the international market. Buyers from different countries may have different standards and preferences regarding animal welfare issues, and might not be willing to pay more for animal welfare enhanced meat products. Therefore, stricter regulations

might push the production of meat to countries where regulations are more lenient, and import of these products to the domestic market as long as demand for cheap, conventionally produced meat in domestic markets remains (Ilea 2009). Fear of a worsened international competitive position of producers contributes to the continued focus on low cost prices in animal production.

A fourth characteristic of the meat supply chain is that producers and retailers tend to be focused on manifest consumer demand, and not latent demand. That is, stakeholders tend to infer from low sales figures (e.g., the low and stable market share of organic meat products) that consumption of animal welfare enhanced meat is not really important to consumers (Bock and Van Huik 2007). However, this conclusion might be over-simplified. An alternative interpretation is that the current dichotomous supply of conventional and organic products only provides for the needs of particular consumer segments, and does not enable consumers in the middle segments to make compromises between animal welfare and price attributes, despite evidence for the latent consumer need for a more differentiated product supply (McEachern and Schröder 2002; Vanhonacker et al. 2007). So the focus on manifest demand hinders product innovation and market creation.

Related to the previous point, few production schemes exist that explicitly focus on animal welfare. Organic livestock systems, where animal welfare is one aspect of the broader sustainability focus, are probably most well-known. However, many farmers consider the step toward switching to organic farming too big (Bock and Van Huik 2007). Veissier et al. (2008) state that there is "an increasing variety of farm production schemes within European member states which contain animal welfare standards that go beyond the legal minimum" (p. 279), but that "communication of these higher welfare standards to consumers through the use of a quality assurance scheme logo on a product or packaging claims does not always happen" (p. 279). A more recent analysis of middle segment products filling the gap between conventional and organic products on the European market shows that this segment is still in its infancy (Oosterkamp et al. 2011). The lack of certification schemes for middle-segment products might inhibit stakeholders to improve upon farm animal welfare standards, because if higher welfare standards are not communicated on the packaged product, there is no visible added value relative to other products, and farmers might not be compensated for increased production costs by the next stage in the supply chain.

Escaping System Lock-in

In the here and now, stakeholders tend to focus on short term self-interest (Van Lange and Joireman 2008). Stakeholders experience difficulty to transform farming systems and offer consumers a more animal-friendly product assortment, despite changes in the socio-cultural and political environment of actors in the meat chain, i.e., increased societal and political interest in animal welfare. However, the difficulty in deviating from the current model of commoditized production makes the system vulnerable in times when societal needs change and increasingly deviate from practices in dominant systems. Therefore, it is important to identify routes

through which stakeholders can be motivated to offer a broader spectrum of animal welfare enhanced meat products. Although many stakeholders are stuck in system lock-in, there is a certain level of flexibility in individual's social and temporal orientations, which allows them to respond to interventions (Van Lange and Joireman 2008). Van Vugt (2009) identified four types of interventions in social dilemma situations, which we prefer to refer to as *motivators* since they are not necessarily initiated or performed by a central authority such as the government. In the current case, these motivators may contribute to strengthened stakeholder commitment to animal welfare improvements, and consumer preparedness to buy animal welfare enhanced products.

The first, and most promising, motivator is *reduced uncertainty*. Economic uncertainty forms an important barrier for chain members to make their production systems more animal-friendly. However, stakeholder collaboration through commitment to a common goal, where the risk of failure is born by multiple parties, enables reduced uncertainty (Ingenbleek and Immink 2010). The meat sector is increasingly moving from conflict between stakeholders with diverging interests around the issue of animal welfare, to collaborative standard setting procedures (Ingenbleek and Immink 2010). The chance of success developing a more differentiated product supply, and public acceptance of welfare concepts, might be improved when partners with insight into consumer preferences and wishes, such as special interest groups, are consulted or participate as a full member of the collaborative stakeholder team (Ingenbleek and Immink 2010). Since each stakeholder has their own agenda and boundary restrictions of their position, there is a challenge to identify minimum animal welfare levels that balance efficiency gains with satisfying the objectives or goals of the standards (Fulponi 2006). A third, independent party might fulfill a bridging and brokerage role in the negotiation process as an innovation broker or innovation intermediary (Klerkx and Leeuwis 2008, 2009). Someone who stands above the interests of the individual stakeholders and who stimulates stakeholders to commit themselves and make concessions, might reduce the competitive mindset group representatives tend to have (i.e., they want their outcome to be better (not worse) than the outcome for other representatives), and result in a more successful negotiation (Van Lange and Joireman 2008). Another type of uncertainty that prevents stakeholders from implementing animal welfare improvements is uncertainty about animal welfare, for example questions related to which factors cause stress and suffering among animals, what means are available to improve upon this, and which systems to improve welfare have the highest potential both from an animal welfare and an economic perspective. Science plays a key role in increasing knowledge about animal welfare. In addition, animal and social scientists need to work together to increase public understanding of livestock production systems and animal welfare. Research might also contribute to effective and informative labeling of animal welfare information on products to enhance informed decision-making, transparency, and eventually consumer likelihood to choose animal welfare enhanced meat products. However, filling the knowledge gap is not the only solution.

The second motivator is related to stakeholders' and consumers' *social identity*. Stakeholders and individual consumers have a need for a positive social identity.

For farmers and retailers this refers to their license to, respectively, produce and sell. Recapturing and/or maintaining this license motivates these stakeholders to make necessary steps to improve animal welfare. Particularly the reputation of retailers can be vulnerable to "naming and shaming" by special interest groups. When individuals identify with a social group, they are more concerned about their in-group reputation, which can stimulate pro-social behavior, such as buying animal welfare certified meat. This requires, however, that there are strong social norms regarding meat consumption. Except in particular involved consumer groups such as flexitarians, vegetarians or vegans (see Povey et al. 2001; Rozin et al. 1997), it is expected that current social norms with respect to meat consumption are weak relative to other social norms, such as those related to recycling or littering. It is difficult to create stronger social norms, because norms are established based on how the majority of a group behaves (descriptive norm) or believes how one ought to behave (injunctive norm). However, these norms might develop over time, since meat consumption decisions are increasingly becoming moral decisions (Rozin et al. 1997). It has been shown that situational cues can activate moral values, and the likelihood of initiating action towards a goal increases when people are made aware of possible actions to act on those values (Biel and Thogersen 2007). A more differentiated meat assortment in terms of beyond regulatory animal welfare levels in the retail environment might assist in the development towards stronger social norms, because it gives people more opportunity to express their dissatisfaction with conventional produce. When a sufficiently large group of consumers starts buying welfare enhanced meat products, what is considered "the norm" might shift.

The third motivator is linked to *credibility and trustworthiness* of claims about animal welfare on products (Frewer et al. 2005). An external assessment from an independent organization or from scientists that a product has been produced at a higher level of animal welfare is a pre-condition for producers and retailers to introduce and position a product in the market as being more animal-friendly produced, in order to prevent negative attention in the media and possible reputation damage. Frewer et al. (2005) found that supermarkets were least trusted regarding animal welfare issues. They were perceived as least knowledgeable and least accountable regarding their activities. Voluntary labeling systems backed by retailers might therefore be distrusted by consumers. Animal welfare claims and labeling systems might particularly be trusted and perceived as credible when the claims are supported by an authority that is highly trusted among the public, such as the Animal Protection Society (Ingenbleek and Immink 2010).

Monetary incentives are the fourth motivator. Self-enhancing motives are among the strongest drivers of behavior (Holmes et al. 2002). In this context, the government can support initiatives from the market (e.g., development of certification schemes or new product concepts) by providing subsidies. Whether development towards more sustainable food production is subsidized depends on the country, since some governments tend to focus on generically increasing the animal welfare baseline level through legislation (e.g., Denmark), whereas others are more likely to support market initiatives (e.g., France, United Kingdom, and The Netherlands) (Oosterkamp et al. 2011). For example, the development of innovations in sustainable and more animal-friendly production systems could be

subsidized by the government from tax revenues from introducing a higher tax tariff on meat (from 6 to 19 %), which has been proposed by a Dutch political party that focuses on animal issues in order to account for the societal costs of meat production and consumption. This "meat tax" is heavily debated, because opponents believe in consumer freedom of choice (i.e., the right to eat meat), and stress administrative, legal, and trade concerns of imposing such a tax. An example of a monetary incentive at the primary producer level is when increased production costs associated with implementing more strict animal welfare standards can be attributed to all parts of the slaughtered animal, i.e., when the market price of both fresh meat and meat for further processing and secondary applications is higher for products coming from animals that have had a better life (Backus et al. 2012). A final monetary incentive to switch to more animal-friendly production systems is when these systems are cost-efficient. Efforts to synergize economic and moral interests instead of contrasting them might lead to innovative animal-friendlier and economically feasible systems.

Reduced uncertainty, strengthened social identity, credibility, and monetary incentives may all function as motivators to overcome the hurdle represented by the system lock-in demotivators related to the dominant focus on efficiency and optimization, the inability to charge the costs of more animal-friendly production for all applications and animal parts, the international competitive position of producers, and the limited existence of production schemes focusing on animal welfare.

Conclusion and Discussion

The aim of this paper was to increase understanding of the discrepancy between the current, undifferentiated market supply of meat products and individual differences in consumer demand for meat products based on the level of animal welfare standards in the production stage. The reviewed literature suggests that at least part of the consumer population is interested in meat products that have been produced at beyond regulatory welfare standards, but are less expensive than organic meat (Meuwissen et al. 2007). Therefore, the meat sector will benefit from doing more justice to the diversity in animal welfare concerns among consumers through catering for specific consumer segments, for example those who are concerned about animal welfare, but simultaneously do not want to give up meat consumption or pay the price premium for meat originating from organic production. This requires a pro-active market orientation and a search for innovations by all actors in the meat supply chain, because manifest market demand for animal welfare enhanced products is weak. That is, market demand is not expressed in purchase behavior. Rather, it is a latent need based on dissatisfaction with conventional production systems and the lack of opportunity to act on this dissatisfaction, due to the dichotomous supply that offers few options to trade-off animal welfare and price. The strategy of using product differentiation to increase consumption of animal welfare enhanced meat products particularly fits with a market model approach to animal welfare policy, which is applied in countries like the United

Kingdom and the Netherlands (Oosterkamp et al. 2011).[2] So, catering for heterogeneity in consumer demand poses a huge challenge to actors in the food chain, who need to go beyond satisfying expressed needs (i.e., the existing business model) to satisfying uncertain latent needs that have to be unlocked by changes in market supply. The development of successful middle-segment meat products to meet the needs and preferences of one or more distinct consumer segments requires that distinct consumer groups are identified (market segmentation), that segments are assessed on their economic viability (market targeting), and that one or more distinctive and attractive positionings are developed (market positioning) (Kotler 1999).

Verbeke (2009) suggests that different segments of consumers should be distinguished on the basis of their interest in information about animal welfare. However, interest in information might only be weakly related to purchase behaviors, particularly it might not very well discriminate between consumers regarding the trade-offs they make between different product attributes, e.g., price and animal welfare level, at the point of purchase. An alternative and powerful approach is to define homogeneous consumer groups on the basis of different *benefits* they seek in meat products, such as a low price, high animal welfare standards, or a combination of both. Benefits sought directly link to product attribute information, and are therefore much closer to behavior than interest in information. Consumer willingness to pay for meat produced at beyond regulatory welfare standards can be assessed through choice experiments where consumers have to indicate their preferences for (hypothetical) packaged meat products that are described in terms of animal welfare level and price, and that include "compromise" products (Liljenstolpe 2011; Pouta et al. 2010). Besides consumer differences regarding the preferred trade-off between animal welfare level and price, identified segments might differ regarding underlying personality and morality structures that guide their purchase decisions (Graham et al. 2011; Huffman et al. 2000), socio-demographic characteristics, shopping location for meat, and how much meat they consume. When segments differ on variables other than those used to identify the segments, this might provide a powerful basis in terms of segment accessibility (i.e., the extent to which segments can be reached and served) in the process of targeting specific products to specific consumer groups.

Not all identified segments can meaningfully be served. The economic attractiveness of the segments depends on the segment sizes, that is, developing a special product for a segment might not pay off when the segment is too small. In addition, attractiveness depends on a segment's willingness to pay for animal welfare enhanced meat as compared to cost prices and perceived feasibility at the primary producer level associated with the implementation of beyond regulatory animal welfare measures. When consumer willingness to pay covers a potential increase in production costs, there is no problem. However, when this is not the

[2] In a market model, hallmarks on products distinguish between products regarding the level of animal welfare, enabling consumers to choose. The market model differs from the welfare state model (e.g., Norway and Sweden), where standards are mostly developed for generic policy, for example stricter regulations regarding animal welfare. It differs from the "terroir" model (France and Italy), where animal welfare is part of a broader quality concept, often linked to region of origin.

case, the costs can be internalized in the costs of supply chain members, or the costs themselves should be reduced. For example, primary producers can investigate in collaboration with animal welfare experts if some farm animal welfare measures can be loosened or omitted such that the increase in production costs is diminished. In addition, it is valuable to take into account which welfare aspects consumers believe are important for animal welfare and currently insufficiently addressed in conventional livestock systems (Vanhonacker et al. 2008), because operational definitions of animal welfare and recommendations regarding animal welfare issues are influenced by the moral values of society (Ohl and Van der Staay 2012). Previous research has shown that consumer concerns about animal welfare are particularly related to space (stocking density and pen size), straw and outdoor access (Bracke et al. 2005; Vanhonacker et al. 2009). Taking these concerns into account as boundary conditions in developing middle-segment meat products might contribute to the successfulness of animal welfare enhanced meat products.

Positioning of a product relates to its *raison d'être*, its characteristics, the benefits it fulfills, and how it stands out from competitive products. For middle-segment meat products, the combination between price level and animal welfare level is of key importance. This information needs to be visible on the packaged product, where a logo or hallmark can be used to communicate the level of farm animal welfare standards at the production stage. However, also segment specific characteristics can be used in positioning the product, such as including on-package moral appeals that fit with the morality and value structure of the consumers in the target segment. Also including additional information on product labels about production practices beyond hallmarks or logos might make it more clear for consumers how the product stands out on animal welfare aspects, and might increase the likelihood that animal welfare is included as a relevant product attribute in evaluating product alternatives (Hoogland et al. 2007). That is, the attractiveness of the product might increase when specific animal welfare measures underlying the product concept that also align with actual concerns of consumers about livestock production systems, are highlighted on the package.

The attractiveness of animal welfare enhanced meat products might also increase when a link can be made to attributes other than animal welfare that have added value for consumers, particularly attributes that fulfil individual consumer needs, such as taste (Hoek et al. 2011). Only for a small number of consumers, moral motivations related to animal welfare are the primary reason to buy animal welfare enhanced products (Vanhonacker and Verbeke 2009). For many consumers animal welfare is a supporting benefit. When it can be "carried" by more selfish attributes, such as taste, health, and quality, animal friendliness becomes part of a broader quality concept (Verbeke 2009). This particularly matches the "terroir" model that is important in Southern European countries (see Footnote 2). In the context of meat substitute products, innovative products are entering the marketplace that can hardly be distinguished from meat in terms of appearance texture and taste, and that have superior nutritional qualities compared to alternative meat substitutes (i.e., low saturated fat and high protein content) (Rensen 2011). Particularly the taste and the texture of these products make them attractive for consumers who want to eat less

meat (i.e., flexitarians), something that has proven difficult for meat substitute products that have been on the market for a while (Hoek et al. 2011).

In the short term, changes to livestock production systems will more likely represent an evolution rather than a revolution (Foxon 2007). Primary producers are reluctant to implement improvements to animal welfare that require high investments, for example housing systems that allow outdoor access and shelter, because these increase their fixed costs and therefore pose too much business risk (Hardaker et al. 2004). In the short term, farmers are more interested in adjustments that can be implemented within their existing housing systems, such as increasing space per animal and the availability of distraction materials, which only increases variable costs. As Dawkins (1987, p. 295) stated 25 years ago: "the realities of commercial farming mean that we cannot 'at a stroke' improve the living conditions of farm animals in every way we might want to". Despite this, the fact that animal welfare is a social issue requires that action is being taken in the short run. That is, social issues have their own dynamics and largely emerge outside the direct control of the value chain. They emerge as a function of NGO activity, governmental laws and regulations, and media attention, including social media. Emerging social issues are in need of issue management to avoid a situation where issues are evolving as social conflicts without potential relief. Developing and implementing a certification system for compromise products and bringing animal welfare enhanced products on the market to meet the needs of specific consumer segments is a complex process (Ingenbleek and Immink 2010). Moreover, social issues like societal concern about farm animal welfare cannot be managed by value chains in isolation, but need to be addressed in close interaction with other stakeholders that surround the value chain (the macro-environment), such as special interest groups (Ingenbleek and Immink 2010). This process is expected to be most fruitful when stakeholders collaborate, possibly aided by an innovation consultant (Klerkx and Leeuwis 2008), because their activities are all interlinked. Together, stakeholders can share and integrate stakeholder-specific knowledge about, for example, production costs associated with implementing higher farm-level animal welfare measures and insights from managing and positioning retail assortments, resulting in animal welfare enhanced products that are feasible for producers and that can be marketed.

Animal welfare is not the only negative externality of conventional livestock production systems. Moreover, animal welfare improvements and contributions of livestock production systems to other societal domains, such as the environment, do not always go hand in hand (Siegford et al. 2008). That is, for most meat types the ecological footprint of organically produced meat is bigger than the ecological footprint of conventional production systems where animals are reared indoors (Blonk and Goedkoop 2009; Bokkers and de Boer 2009; Halberg et al. 2010; Leinonen et al. 2012), although Hörtenhuber et al. (2010) found GHG emissions for organic dairy production systems were lower compared to conventional systems. For example, greenhouse gas emissions (e.g., ammonia) are higher in open housing systems where animals have outdoor access compared to indoor housing systems (Ivanova-Peneva et al. 2006), where air scrubbers can be applied to prevent emission from pollutants and odor (Philippe et al. 2011). Therefore, it is important to have a diversity of systems in place, where some are more extensive and others

more intensive, and where some focus more on (beyond regulatory levels of) environmental friendliness and others more on animal-friendliness (De Boer and Udo 2010). This offers the heterogeneous consumer population a diversified range of products and enables them to make different trade-offs between different aspects of meat consumption. A more differentiated supply might increase the likelihood that consumers want to avoid products produced at the lowest standards, and might scale up the welfare level and/or reduce the ecological footprint of the meat that is consumed. That is, without restricting freedom of choice, a differentiated supply might "nudge" consumers to upgrade the animal-friendliness of their meat consumption (Thaler and Sunstein 2008).

In addition to focusing on improvements in a single domain, system innovations (radical innovations) are necessary in livestock production systems to make true contributions to animal welfare, in combination with improvements in other domains, such as reducing environmental impacts of meat production (Siegford et al. 2008). Traditionally, solutions to negative externalities of livestock farming, for example ammonia emissions, were sought in the development of technical measures, such as decreasing the surface area and the time period where manure and urine are in contact with open air. Such solutions often had negative side-effects for the animals, since their possibilities for movement and social behavior with other animals were often further constrained. However, synergy between system goals (e.g., reduced emission, but also economic viability) and natural animal needs and goals can be reached when animal housing systems are designed around behavioral characteristics of the animals involved, and making optimal use of these characteristics (Bos and Grin 2008; Bos et al. 2003). For example, emission reduction and the natural needs of sows can be combined in a group housing system where different functional areas are created, through which excreting behavior is directed to specific locations, simultaneously allowing sows to circulate freely (Bos et al. 2003). The development of system innovations that increase the overall sustainability of livestock production is typically a long term objective.

There is still a long way to go regarding meeting future demand for animal proteins, implementing more animal-friendly livestock production systems, and reducing the environmental impact of livestock production systems. New scientific insights and smart innovations will contribute to this, as well as stakeholder efforts to meet societal needs, both in terms of food supply and in terms of engaging in socially responsible behaviors. The challenge to all stakeholders involved is to determine in what direction to move, at what pace, such that it ensures desirability in direction, feasibility in approach, and sufficient alliance with the financial objectives for each actor in the chain.

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