Rainforest, Reef, and our Appetite for Beef: Communication for Sustainable Behaviour Change

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Abstract

Meat production, and the current rate of consumption, is one of the leading causes of tropical deforestation, freshwater degradation, ocean dead zones, and wild species extinction. The livestock sector is also a major driver of global climate change, such that meeting the 2°C climate objective will be impossible to achieve without a global shift towards a plant-based diet. Despite its gravity, the environmental impact of the meat industry is severely underrepresented in policy and communication, which has resulted in a widespread public awareness gap.

The present research sought to assess whether closing this awareness gap had the potential to induce attitudinal and behavioural dietary change. In a controlled experiment, an online survey presenting an environmentally-framed essay about animal agriculture was administered to North American participants. Participants answered a series of questions assessing their response to the information.

The results indicate that the environment frame, as applied to animal agriculture, was both new and valuable to most participants, with many expressing increased concern. Over half of the participants also experienced a change in dietary choice after reading the essay. These findings suggest that closing the public awareness gap, by using the environment frame to disseminate information, is an effective means of promoting dietary change.
Preface

On my bookshelf is a book that I received when I was twelve years old. I have no idea who gave it to me, or how it ended up on my shelf at all. But in this book is a picture, the one you see to the right. This picture resonated me on many levels, and I will never forget it.

Underneath the picture is written the unsettling fact that we destroy a football field of tropical forest every second just to produce 250 hamburgers. The notion that we destroy swathes of natural ecosystems - some of which took an unfathomable amount of geologic time to evolve such complexity – for the unnecessary luxury of hamburgers blew my twelve-year-old mind. Equally as mind-blowing was the unceasing persistence of such habits among my peers, which, in the light of this information, astonished me.

The picture lingered in my mind until 2016, when I decided to do something about it.

This little space cannot possibly express how thankful I am to everybody who helped me this year, who shared their ideas with me, who encouraged me, who helped retain my sanity, who talked me through my times of doubt, and who saw value in what I was doing. Thanks especially to my supervisor, Jesse Bering, and my coordinator, Fabien Medvecky, for the above. My gratitude goes to the amazing people I am lucky to call my friends, especially everyone here at Sci Comm (you guys are awesome) and Jean Fletcher for the invaluable statistics help. To my family, partner, and those closest to me, thank you for your love and enduring support. The biggest thanks, though, must go to my mother, who raised me to be the way I am, instilled her values into me, and made me into the person I am today.

Thank you.
Structural overview of the thesis

This academic thesis includes a review of the subject matter and previous research, a presentation of the current research, and a discussion of the findings. It is composed of seven chapters.

Chapter One provides a brief introduction of agricultural history and the advent of large-scale, corporate-driven farming practices. It assesses the consequences of this transition in terms of current and future ethical, welfare, and environmental concerns (the latter of which will be the focus of this thesis). Chapters Two and Three present an extensive review of the relevant literature, covering material which falls under the wider umbrella of the subject matter. Chapter Two discusses the reasons behind the prevalence of animal-based diets and their resistance to change, including socio-cultural factors, psychological mechanisms to alleviate cognitive dissonance, and media representation and social construction of the issue at large. Chapter Three, being the final chapter of the literature review, discusses various communication strategies and framing devices that may be used to facilitate attitudinal and behavioural change. In this way, the chapter provides an assessment of contextual frames which may be used to guide future discourse in this area. Research questions are presented at the end of this chapter.

Chapter Four presents the research design and methodology. It covers the rationale behind the methods adopted for the current study, the survey design, recruitment of participants, data analysis, and coding techniques. The research results are presented in Chapter Five, and these data are discussed and interpreted in Chapter Six, in the context of previous literature and theoretical frameworks. Finally, Chapter Seven presents some concluding remarks and suggestions for both future research and science communication in this area. This is followed by the Appendices, which include the essay and questions used in the methodology, as well as the ethics approval form. This concludes the academic thesis.
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1 Introduction

1.1 The onset of large, corporate farming systems

Until the 1940s, agriculture was based on the use of pasture for raising animals, a system remaining largely unchanged since the first animal domestications approximately 10,000 years ago (Napolitano, Serrapica, & Braghieri, 2013). However, industrialisation introduced several changes with the intent of increasing productivity and profit while reducing economic costs. Intensive livestock production (also known as factory farming or Confined Animal Feeding Operations [CAFOs]) was developed to achieve these financial objectives, and it has since become the fastest growing and most prevalent form of meat production worldwide (Nierenberg, 2006). In fact, an estimated 99 percent of all animals raised for slaughter in the U.S. come from factory farms (Foer, 2010). With increasing support from governments and corporations, large-scale factory-farming operations have almost completely displaced the small, locally owned farms that preceded them (Freeman, 2009). Around 70 billion land animals were slaughtered globally in 2011 (FAOSTAT, 2016), a figure that has risen exponentially every decade since official record-keeping began in 1961. In fact, the number of land animals slaughtered for food in 1961 numbered 8.3 billion (FAOSTAT, 2016) a disconcerting figure given that the global population has “only” doubled in that time.

Throughout the modern industrialized world, CAFOs have swiftly become the standard operating procedure in animal agriculture, creating unprecedented meat supply to satisfy unprecedented dietary demand. Despite its economic merits, however, this highly mechanised system of farming has also introduced a host of problems and concerns, ones based primarily around animal welfare and the deleterious impacts of factory farming operations on the natural environment. The former issue, animal welfare concerns, is much more commonly employed in anti-meat argumentation. It is to this topic we will now turn.
1.2 Animal welfare and ethical considerations

A clue to animal welfare concerns within the animal agriculture sector lies in the term “Confined Animal Feeding Operations” itself, which provides an apt description of the codes in which the system is grounded. Before CAFOs came into prominence, cattle and other farm animals were allowed space and time in pasture, and were otherwise treated humanely before their time of slaughter. Conversely, CAFOs are characterised by their confinement, overcrowding, selective breeding, and intensive feeding, methods that transform these animals from living beings into units of production and profit and, in many cases, causing enduring pain, lameness, disease, and psychological stress (D’Silva, 2006).

The unnatural conditions under which factory farm animals are kept have led experts to consider a variety of important ethical issues regarding such practices. Is it right to treat animals in this way? For decades, scholars have attempted to grapple with questions such as whether it is morally acceptable to confine, exploit, shorten the life of, genetically modify, mutilate, or otherwise subject farm animals to such physical and psychological trauma.

Ethical theory commonly accepts that the existence of mental states is an important factor in determining the moral rights or status of animals. Mental states include properties such as sensory perception and the ability to suffer (Spedding, 2000); desires and preferences (Singer, 2011); self-consciousness (Carruthers, 1992); emotions (Morris, Knight, & Lesley, 2012); or advanced social cognition (e.g., theory of mind) (Benz-Schwarzburg & Knight, 2011). These determinants of moral concern are intrinsically anthropomorphic in nature, and, consistent with ingroup-outgroup derogation theory, if an animal’s mental properties are perceived to be sophisticated and closely match those of our own, it is generally afforded more moral concern (Plous, 1993). However, evidence suggesting the existence of these properties in nonhuman animals is increasingly emerging. Cultures, language, theory of mind, and related socially transmitted behaviours have been observed among apes, dolphins, corvids, and others (Benz-Schwarzburg & Knight, 2011). Evidence of conscious thinking, episodic memory, and subjective experience have been observed in birds, apes,
and monkeys (Griffin & Speck, 2004). Furthermore, Rogers and Kaplan (2004) stress that we must consider “…only a handful of species have been researched and current findings would suggest that many more species might be found to have exceptional cognitive abilities, if we only looked,” (p. 193). Although farm animal cognition is comparatively under-studied, there has been evidence of learning, emotion, intelligence, and pain perception in cows, pigs, hens, even fish (Brown, 2015; Désiré, Boisse, & Veissier, 2002; Nicol, 2010). According to many researchers, it is becoming increasingly clear that sophisticated mental properties are not exclusive to the human domain, and this should be considered when assessing species inclusion within the moral circle of concern regarding factory farming practices.

1.3 Environmental impacts of animal agriculture

In addition to the ethical considerations surrounding animal welfare, the livestock sector is also among the most significant contributors to the world’s most serious environmental problems. The widespread abandonment of traditional methods of pastoral farming in favour of high-density, industrial-styled animal production systems has intensified land-use change, deforestation, pollution, wild species extinction, and greenhouse gas emissions on a global scale.

1.3.1 Animal agriculture and land use

The rising demand for meat and feed crops has driven rapid expansion and intensification of the animal agriculture industry. This expansion has replaced the many of the world’s natural ecosystems through processes such as deforestation, grassland conversion, and wetland draining. From 1690 to 1990, the extent of global cropland for feed production increased more than five-fold, and pastureland increased to an area 3.5 times larger than the United States (Goldewijk, 2001). Most of the lands used for livestock, and the production of their feed, were originally old growth and primary forest concentrated largely in the tropical Amazon. Here, over 80 percent of deforested land is used for livestock or feed production, with most of these products meant for domestic and international markets (Nepstad, Stickler, & Almeida, 2006). Worldwide, tropical forests have declined to 11 million
km² from 17 million km² (Wright, 2010). Similarly, almost half of the planet’s natural grasslands have been lost (Goldewijk, 2001). Although some of the agricultural expansion is driven by farmers growing crops for direct human consumption, livestock and feed production account for almost one third of ice-free land surface on the planet (Steinfeld, Gerber, Wassenaar, Castel, & Haan, 2006). This makes livestock production the most expansive form of anthropogenic land use.

One of the primary reasons behind the sheer magnitude of land devoted to livestock production lies in the inefficiency of animal protein production. Meat has a high ‘diet impact ratio’, or a high environmental impact per calorie of food supplied (White, 2000). This means that up to ten times the quantity of land, energy, and water are needed to produce animal protein relative to a caloric equivalent of plant-based foods (Dutilh & Kramer, 2000; Gerbens-Leenes & Nonhebel, 2002; Goodland, 1997; Harrison & Pearce, 2000). According to Pimentel and Pimentel (2003), around one hectare of cropland could feed about 30 people. By contrast, the same amount of land used to produce meat or dairy would only feed, on average, between five and ten people. In fact, eliminating our species’ dietary dependence on livestock altogether and instead transitioning to a plants-only (crop-based) means of sustenance would serve to produce enough food on extant croplands by an estimated 70 percent. This translates to a caloric output exceeding the amount needed to feed the entire projected human population in the year 2050 (Cassidy, West, Gerber, & Foley, 2013; Machovina, Feeley, & Ripple, 2015).

1.3.2 Animal agriculture and ecological degradation

Agricultural expansion also exerts heavy pressure on the world’s ecosystems. At particular risk are freshwater and estuarine ecosystems, which together sustain around one third of all vertebrate species (Dudgeon et al., 2006), many of them endemic. Similarly, as livestock production intensifies, the demand for water will also increase, resulting in increased damming and river diversion. Over 150 large hydroelectric dams are planned for the Amazon region alone, which, if implemented, will cause altered flows, higher water, temperatures, lower dissolved-oxygen levels and elevated nutrient loads in the region’s
many lakes and rivers (Finer & Jenkins, 2012).

The livestock sector also produces a significant amount of waste, estimated to be responsible for approximately 64 percent of all global anthropogenic ammonia emissions (Steinfeld et al., 2006). U.S. factory farms alone produce 788,000 tons of manure each day (Farm Sanctuary, 2011). This exceeds that which can be absorbed by cropland, and, combined with other factory-farming pollutants such as heavy metals, pesticides, fertilisers, veterinary drugs, hormones, and pathogens, leaches into surface and groundwater. This toxic pathway causes a cascading series of negative effects on ecosystems and communities, such as acidification of habitats, elevated sediment, nutrient, pesticide, and pollutant levels, higher water temperatures, lower levels of dissolved oxygen, increased coastal eutrophication, and the associated loss of freshwater and marine biodiversity (Dudgeon et al., 2006; Steinfeld et al., 2006). In fact, manure effluent and the overuse of fertilisers are a driving force behind over 400 eutrophic “dead zones” that exist at river mouths worldwide (Diaz & Rosenberg, 2008).

1.3.3 Animal agriculture and climate change

Livestock production is believed to play a significant role in climate change. Estimates of these harmful effects vary, but most experts believe that factory-farming operations contribute somewhere between 10-35 percent of total anthropogenic greenhouse gas emissions (EPA, 2006; McMichael, Powles, Butler, & Uauy, 2007; Stern, 2006). This equates to around 4.6-7.1 billion tonnes of greenhouse gases each year (Steinfeld et al., 2006). Although carbon dioxide (CO₂) is released via the expansion of pasture and arable land for feed (at the expense of the carbon stores that are natural grasslands and forests), the livestock sector is a more significant source of methane (CH₄) and nitrous oxide (N₂O), both of which are highly potent greenhouse gases. Of all global agricultural emissions, 9 percent consists of CO₂, 35-45 percent of CH₄, and 45-55 percent of N₂O (Baumert, Herzog, & Pershing, 2005; IPCC, 2007; McMichael et al., 2007).
Methane is released from stored manure and enteric fermentation, a digestive process of ruminant livestock, such as cattle and sheep. There were an estimated 3.6 billion domestic ruminants in 2011, with an average of 25 million being added per year over the past 50 years (Ripple et al., 2014a). These numbers indicate that enteric fermentation alone can be considered the most significant source of global anthropogenic methane (Watson, Meira Filho, Sanhueza, & Janetos, 1992), a worrisome fact given that methane has a global warming potential 86 times that of CO₂ on a 20-year time frame (Shindell et al., 2009). Emissions of nitrous oxide are similarly significant, and are predominantly released through manure, as well as the intensive overuse of nitrogen-based chemical fertilisers for feed production.

The inefficiency of livestock production and feed conversion also plays an essential role in the magnitude of agricultural greenhouse gas emissions. The production of 1 kg of beef requires the equivalent of 14.8 kilograms of CO₂, having a similar environmental impact to driving 160 km in an average car. Similarly, a study in the UK found that emissions from beef amount to 16 kg CO₂/kg of beef, compared to 0.8 kg CO₂/kg of wheat (Garnett, 2009). Findings reported by Carlsson-Kanyama and González (2009) places this figure closer to 30kg CO₂/kg of beef and indicated that meals matched in caloric content can differ in greenhouse gas emissions by a factor of 2-9, with plant-based meals being considerably lower in emissions output. Together, such studies strongly suggest that it is far more climate-efficient to produce protein from plant sources than from animal sources.

1.3.4 Animal agriculture and wild species extinction

Across global ecosystems (but disproportionately concentrated in the tropics), 25 biodiversity hotspots on the planet have been identified. Such regions host exceptional levels of species richness, endemism, and the bulk of yet unknown species (Myers, Mittermeier, Mittermeier, Da Fonseca, & Kent, 2000; Scheffers, Joppa, Pimm, & Laurance, 2012). The collective area of these hotspots once spanned about 12 percent of Earth’s land surface, but has now shrunk by about 90 percent of this original total (Myers et al., 2000). The current global rates of extinction are approximately one thousand times the estimated background rate, with far greater higher species declines occurring in the tropics (Dirzo et
al., 2014; Pimm et al., 2014). The regional overlap with the land used for most livestock production indicates that this particular form of human land use is the leading cause of modern species extinction. Westhoek et al. (2011) estimate that 30 percent of global biodiversity loss is directly attributable to livestock production (i.e., through arable expansion for both pasture and feed), though this figure does not include the extinctions caused by other environmental consequences of livestock production, such as those involved in climate change and water pollution.

Conversion of natural habitats for agricultural purposes has affected species composition, abundance, and biodiversity across multiple ecosystems, and these effects vary among taxa (Kim & Byrne, 2006). Of particular concern are top predators and large-bodied animals that play functional ecological roles. In a case study of the Pampas region in Argentina, Medan, Torretta, Hodara, de la Fuente, and Montaldo (2011) found that habitat destruction, fragmentation, and other effects driven by livestock production has resulted in steep declines of ungulates, reptiles, birds, insects, and amphibians. Some species, including the cougar (Puma concolor), jaguar (Panthera onca), and maned wolf (Chrysocyon brachyurus) have been hunted to regional extinction to protect livestock. Ninety-four percent of the world's terrestrial carnivores are negatively affected by habitat loss or eradication — by means of shooting, trapping, or poisoning — due to the threat of livestock predation (Ripple et al., 2014b). Similarly, around 60 percent of the world's large wild herbivores are facing population decline, range contraction, and resource depression due to human encroachment for livestock production purposes (Ripple et al., 2015). However, species at every trophic level are at risk given the cascading, interlinked, and often unpredictable connections within ecosystems. Considering this, Medan et al. (2011) stress that "the fate of a substantial part of terrestrial biodiversity will depend on their capacity to exist within agroecosystems," (p. 3078).

1.3.5 Meat consumption: future projections and impacts

The growing environmental impacts of animal agriculture are alarming given the high rate of meat consumption, a rate that has almost tripled over the last five decades (Brown et al., as cited in York & Gossard, 2004) to reach a global average of 42 kg per year in
Global variation within this figure is notable, with the average American consuming 124 kg per year and other Western countries being close behind; moreover, the rate for developing countries is rapidly increasing (Bonhommeau et al., 2013; UNEP, 2012).

The effects of excessive meat consumption are especially alarming when considered alongside the ever-rising human population, which is estimated to reach 9 billion by 2050 and 11 billion by the end of the century (United Nations, 2013). Alongside rising per capita affluence (Keyzer, Merbis, Pavel, & Van Wesenbeeck, 2005; York & Gossard, 2004), population growth is expected to encourage an increase in demand for animal protein by 76 percent (against a 2005-07 baseline) by 2050 (Alexandratos & Bruinsma, 2012). This projected increase equates to an estimated 1 billion hectares of additional land being required, an area larger than Canada (Tilman et al., 2001); the disappearance of 11-36 percent of forests (Wright, 2010); an estimated 1.9 billion tonnes of additional greenhouse gas emissions by 2030 (Fiala, 2008); and the associated extinction of 15-37 percent of species (Thomas et al., 2004). Although food production may be able to meet projected future demand, our species’ heavy dependence on factory farming will come at an increasingly significant cost when considering its harmful effects (Herrero & Thornton, 2013).

1.4 The importance and co-benefits of dietary shift

Responses to the problem of animal agriculture’s considerable contribution to climate change and other forms of environmental degradation have focussed largely on making changes to the supply side, or the producers, particularly through the development of technological innovations that serve to offset emissions. However, multiple studies have demonstrated that changes in supply-side policies alone will be insufficient to achieve the reductions needed to limit the rise in global temperatures by 2°C, the international objective for climate mitigation (Bajželj et al., 2014; Hedenus, Wirsenius, & Johansson, 2014). Alone, mitigation gained from technical innovation is likely to reduce emissions by 32 percent, a figure that would fail to accommodate the projected surge in population growth and the attendant increased demand for animal protein (Gerber et al., 2013). Similarly, Wollenberg et
al. (2016) argue that current supply-side interventions would deliver only about 21-40 percent of the climate mitigation required. By contrast, Stehfest et al. (2009) estimate that a demand-side global transition towards low meat diets could reduce costs of climate change mitigation by as much as 50 percent by 2050. In other words, demand-side or consumer behavioural changes, together with developing technologies and supply-side strategies, are crucial in helping us to avoid catastrophic climate change in the future.

Although a general belief in the environmental necessity for reduced meat consumption is largely unanimous amongst the scientific community (e.g., Baroni, Cenci, Tettamanti, & Berati, 2007; Duchin, 2005; Marlow et al., 2009; McMichael et al., 2007), opinions differ as to just how much reduction is needed. Machovina and Feeley (2014) argue for a goal of limiting daily consumption to a portion equivalent to the size of a deck of playing cards (or smaller). Similarly, McMichael et al. (2007) reason that to stabilise livestock-related emissions at 2005 levels, global consumption per person will need to drop to 90 grams per day by 2050, levels consistent with the nutritional recommendations of the Harvard healthy diet (Bailey et al., 2014: the “protein myth” will be explored further in section 2.2.3). However, the implementation of lowered consumption goals will be challenging for countries whose per capita consumption is several times higher than the global average.

In addition to environmental integrity, reductions in per capita meat consumption would yield additional benefits, such as improved public health (Machovina et al., 2015), a lowered global mortality of 6-10 percent (Springmann, Godfray, Rayner, & Scarborough, 2016), and reduced starvation rates among the world’s poor, since 40 percent of the world’s grain supply currently feeds livestock (Harrison and Pearce, 2000).
2 On meat’s place in society and culture

To facilitate individual and societal behavioural change, and to ensure the public’s receptivity to any government initiatives concerning dietary choice, greater levels of social awareness and understanding of the links between diet and the environment are essential. Currently, however, a noticeable lack of attention is given to these issues within the public discourse. This is likely the result of meat’s privileged place in most cultures and the psychological processes enabling continued consumption. This chapter will explore the reasons why the primary method of inducing dietary change, an animal-welfare based argumentation approach, has been largely ineffective on the global scale needed.

2.1 The meat paradox

To satisfy global demand for animal protein, over 50 billion land animals per year are slaughtered for food (Gerber et al., 2013). Meat is a desirable staple in most diets, and many people do not consider a meal complete without animal protein (Sobal, 2005). In some societies, meat consumption is so deeply ingrained in the local eating custom that it appears to meet the criterion of a behavioural addiction, which is defined as the pursuit of satisfying, short-term pleasure at the expense of longer-term negative effects. Such behaviours are usually characterised by an individual’s strong drive to engage in the act while denying or minimising any harmful consequences. However, like air travel, an entrenched behaviour with similarly negative environmental impacts (Cohen, Higham, & Cavaliere, 2011), the form of behavioural addiction associated with meat-eating primarily harms others, such as animals and the global environment, rather than the consuming individuals.

The role of meat in society, particularly its prevalence in the average diet, would seem to imply that most people do not care about animals. Yet research has repeatedly shown this is not the case. In general, most individuals hold favourable attitudes towards animals (Driscoll, 1995; Hills, 1995), particularly those perceived as being similar to humans in terms of biological, behavioural, and social factors (e.g., nonhuman primates, Batt, 2009).
According to affective disposition theory, which shows how our disposition towards characters relates to our enjoyment of a narrative, liking is a precursor to empathic emotions (Zillman, Taylor, & Lewis, 1998). Indeed, research indicates that most consumers not only want farm animals to be well cared for (Grimshaw, Miller, Palma, & Kerth, 2014; Lusk, Norwood, & Prickett, 2007), but would also support laws protecting them from cruelty and granting them enough space to allow natural behaviours (Humane Research Council, 2008; Zogby, 2003). This is consistent with the findings of the European Commission (2007), whereby the importance of farm-animal welfare was given an average rating of 7.8 out of 10 among citizens polled. Alongside this apparent concern for other animals’ welfare, however, most culinary traditions include highly cherished meat-centric diets.

Continued participation in meat consumption therefore represents a widespread attitude-behaviour gap. Some experts have referred to this tension between most people’s positive feelings towards animals and their meat-saturated diet as the “meat paradox.” In other words, people both love, and love to eat, animals (Joy, 2009; Loughnan, Haslam, & Bastian, 2010a). The meat paradox presents a moral conflict in those who are disturbed by the thought of their behaviour harming animals. Consistent with cognitive dissonance theory (Festinger, 1962), individuals may resolve this conflict either by bringing their behaviour into alignment with their moral ideals or attitudes (i.e., by rejecting meat), or by bringing their beliefs into alignment with their behaviour by using psychological strategies (e.g., denying farm animals the capacity for emotional suffering). The former is a viable solution; findings from studies by Fessler, Arguello, Mekdara, and Macias (2003), and Rozin, Markwith, and Stoess (1997) suggest that most vegetarians experience little to no tension between their diet and beliefs. However, given the historical and cultural significance of meat, the challenges in abandoning a longstanding diet that includes meat, and the fact that “ethical” (i.e., sustainable or organic) products comprise less than 1 percent of market share (MacGillivray, 2000), it seems that the latter approach, adopting beliefs that accommodate or justify behaviour, is a far more common way for people to resolve the meat paradox.

Furthermore, attitudes alone tend to be a poor predictor of marketplace choice (Kraus, 1995); taste, price, and health considerations (or, personal and immediate concerns)
shape consumer decision-making far more than the relatively abstract, indirect, or societal consequences of animal welfare or environment (Bailey et al., 2014; Lea & Worsley, 2003; Ruby & Heine, 2012). This is further shown to be evident from the respective proportions of omnivores and meat abstainers globally: the latter seldom exceed 10 percent of a given population (Loughnan, Bastian, & Haslam, 2014). As we will see in the following section, a wide range of psychological mechanisms is frequently employed to alleviate the cognitive dissonance caused by the meat paradox faced by omnivores.

2.2 Alleviating cognitive dissonance

Many different strategies can serve to alleviate cognitive dissonance when it comes to meat-eating, by those for whom such behaviours conflict with personally held attitudes, intents, or beliefs about animal welfare. Rothgerber (2014) argues that these psychological tactics can be grouped into three main categories: hiding or avoiding the injury; denying one’s role or responsibility in causing harm; and denigrating the victim. The first two categories are characterised by an apologetic approach, whereby the individual avoids the issue or downplays their own role in causing harm. Conversely, strategies in the third category attempt to rationalise or justify consumption without evasion.

2.2.1 By hiding or avoiding the injury

Plous (1993) argues that one of the easiest and most efficient ways to avoid dissonance could be by distancing oneself from information that conflicts with pre-existing cognitions. This is especially useful in the act of purchasing meat. Signicom (as cited in Rothgerber, 2014) found that 67 percent of people do not think about animal suffering while purchasing meat, and those that do are less willing to partake in purchase and consumption (Hoogland, de Boer, & Boersema, 2005). Furthermore, people avoid thinking about the animal origins of meat. Dissociating animals from food products allows people to eat “beef” and “bacon” without thinking about cows and pigs; those who do think about the animal origins of meat show discomfort and reduced willingness to consume it (Tian, Hilton, & Becker, 2016). This also explains the observed disgust among consumers when presented with red or bloody meat, or parts in which the animal origin is made salient, such as eyes or
brains (Kubberød, Ueland, Tronstad, & Riswik, 2002). The grounds on which these studies are based is consistent with the hidden nature of factory farming and meat production. Avoidance has become a cultural norm by means of the supply-side modifications in conjunction with legal guidelines that make information (such as conditions and practices) surrounding animal welfare in factory farms largely invisible (Joy, 2009).

The obfuscated nature of meat production operations has lent itself to a widespread ignorance among the public regarding the industry’s standard practices as they relate to animal treatment. Knight, Nunkoosing, Vrij, and Cherryman (2003) report that not only were people unaware of production procedures, but many expressed that their ignorance was the result of not wanting to know. Since knowledge of animal-use procedures generally leads to reduced support, such wilful ignorance may be considered a form of repression for avoiding mental or moral discomfort. McDonald (2000) suggests that it may also be a way to sidestep the substantial effort required to alter meat-eating habits.

A third factor of note is the diffusion of responsibility, or related to this, the tendency to be less likely to take action or assist when others are present (also known as the “Bystander Effect,” see Waller, 2007). This principle can be applied to animal welfare. People may assume that the government would intervene if animal abuse were as widespread or common as activists claim. As such, much of the public believes their role as individuals in the systematic abuses of the factory-farming industry is small, or perhaps even inconsequential given the awareness of others and the perceived regulatory power of the government and organisations (Lusk et al., 2007).

2.2.2 By denigrating the victim

Eating animals becomes ethically troublesome when animals are seen as worthy of moral concern. Such concern is based primarily on similarity to humans or the possession of anthropocentric qualities (e.g., consciousness and emotions). Humans are adaptively predisposed to favouring those that are considered similar to them. This is consistent with studies on outgroup derogation, whereby marginalised outgroups are portrayed as
animalistic (Costello & Hodson, 2009) and denied uniquely human characteristics such as intelligence, values, and the experience of secondary emotions like love and hope (Haslam, 2006; Leyens et al., 2000). In a sense, dehumanisation also applies across species boundaries. Those species that are considered part of our ingroup — those considered fundamentally similar to humans — are afforded more moral concern than those seen as dissimilar (Plous, 1993). The fundamental aspect of similarity is the possession of a mind (see Bandura, 1999) and there is a strong negative correlation between people’s attribution of mental abilities to animals and their perceived edibility (Haslam, & Radke, 2012). Recognising the presence of mind in animals also reflects people’s awareness of animals’ ability to experience fear, pain, and suffering. Denying this similarity between humans and other animals by denying the latter a mind, the capacity to suffer, or some combination thereof, diminishes their moral standing and psychologically renders any suffering associated with meat consumption justifiable.

Many aspects of animal consciousness remain elusive to comparative scientists, but there is no doubt that most species possess minds and cognitions of some form. Belief in animal minds is generally common among people and leads to greater empathic concern and reduced support for human use (Almeida, Vasconcelos, & Strecht-Ribeiro, 2015; Hills, 1995; Knight, Vrij, Cherryman, & Nunkoosing, 2004; Phillips & McCulloch, 2005). However, Epley, Waytz, Akalis, and Cacioppo (2008) point out that animals may be afforded or denied minds at our convenience and depending on the moralistic circumstances. For example, denial of animal mind commonly occurs in people who feel responsible for the harm caused to others (Castano & Giner-Sorolla, 2006), especially animals that are instrumentalised (Loughnan et al., 2010b) or simply categorised as food (Bratanova, Loughnan, & Bastian, 2011). Driscoll (1995) confirms that animals that are useful or eaten by humans are considered less intelligent and lovable. These findings are further developed by a series of experiments confirming that animals are afforded lesser minds, capacities to suffer, or moral concern in people both immediately before and after partaking in consumption (Bastian et al., 2012; Loughnan et al., 2014). This is consistent with previous research illustrating lowered mind attribution and possession of secondary emotions as a result of both situational and chronic meat consumption (Bilewicz, Imhoff, & Drogosz, 2011).
Belief in animal mind generally corresponds with a belief in animal pain sensitivity, another critical factor in the cognitive dissonance associated with the meat paradox. Denial of farm animals’ capacity to suffer was demonstrated in a study by Levine, Mills, and Houpt (2005), in which 50 percent of veterinary students considered the same castration practice cruel for a dog yet acceptable and even humane for cattle or sheep. This, along with the studies assessing belief in and denial of animal mind, indicates that our compassion and concern for animals is likely affected by our tendency to empathise with them, which in turn is influenced primarily by their perceived similarity to our own species.

To a lesser extent, lowered mind attribution may also be due to the fact that many people have limited personal experience with farm animals beyond their consumption and prototypical images of farm environments, which are of course heavily editorialised by the industry.

2.2.3 By rationalising consumption

Like denigrating the victim, rationalisation of meat consumption employs a non-apologetic approach by favouring pro-meat justifications. Rationalisation allows people to continue engaging in practices or beliefs while maintaining a moral image of oneself and diffusing guilt (Bandura, 1999). Joy (2009) argues that rationalisation strategies regarding meat consumption may be centred around three categories: Natural, Necessary, and Normal (collectively known as “the 3Ns”).

The ‘natural’ argument appeals to aspects of our evolution and resultant biology, such as dentition and the layout of our digestive organs, compared to those of natural carnivores and herbivores. It argues that our ancestors required meat for survival, strength, and cognitive development, and that the consumption of animals is a normal occurrence in nature. Although it is true that our ancestral dependence on animal protein facilitated our species’ neural development (see Mann, 1998), such arguments are fundamentally fallacious as an appeal to nature for moral guidance about contemporary ethical decision-making (i.e., natural is “good”).
The ‘necessary’ argument is related to the ‘natural’ argument, and claims that meat is integral not only for survival, but for the maintenance of a strong, healthy body. This is echoed by findings from a study by Knight et al. (2003), in which participants employed a cost-benefit analysis when assessing the acceptability of animal use by humans. Only when participants could not identify alternatives was animal use justified, and this was the case for animals used for food as well. Although proteins from animal sources are of high quality and contain all the essential amino acids (Hoffman & Falvo, 2003), well-planned, plant-based diets are lauded by leading nutritionists (e.g., American Dietetic Association, 2009; Rand, Pellett, & Young, 2003) as healthful, nutritionally adequate, beneficial in the prevention and treatment of certain diseases, and appropriate for individuals during all stages of life. The inconsistency of belief regarding meat versus plant-based diets is also likely to be steeped in the gross overestimation of necessary protein consumption levels (Šebek & Temme, 2009 as cited in de Bakker & Dagevos, 2011). In actuality, many medical sources advocate the reduction or replacement of animal proteins in everyday diet (see The Physicians’ Committee for Responsible Medicine, n.d.; Tuso, Ismail, Ha, & Bartolotto, 2013). Still, the perceived necessity of animal consumption for adequate nutrition—a phenomenon known as “the protein myth”—remains persistent. Not only does this belief enable the false justification of meat consumption, but it also assists individuals in avoiding responsibility for the ill treatment of animals in food production.

Finally, the ‘normal’ argument centres on the fact that eating meat is deeply embedded in societal, cultural, and individual identity. Meat is a prevalent and cherished aspect of worldwide dietary composition, forming the bulk of most western meals (Holm & Møhl, 2000). Meat also has symbolic significance, being traditionally linked with strength, health, wealth, masculinity, and other forms of self-identity (Heinz & Lee, 1998). While recent research indicates a possible shift in these links (de Bakker & Dagevos, 2011), meat’s place in society and culture makes it the most prevalent and expected food in modern life.

Considered together, these 3N’s form the bulk of pro-meat justification. However, Piazza et al. (2015) argue for the inclusion of a fourth category: ‘nice’. There is ample evidence that taste is a better predictor of behavioural intention than are ethical concerns,
and the enjoyment derived from meat consumption is a key barrier to reducing or eliminating consumption (Lea & Worsley, 2003; Ruby & Heine, 2012). This may have originated from an evolved preference for foods high in fat, protein, and calories, and is therefore linked closely with the ‘natural’ and ‘necessary’ arguments. For many, this is enough of a justification for continued consumption.

2.2.4 By supply-side influences

Mechanisms of moral disengagement to enable continued meat consumption are further encouraged by covert commercial strategies on the supply side. Modern methods of meat processing, packaging, and marketing are extremely effective at disguising the animal origin of the food. Slaughterhouses are located well away from the public eye (Plous, 1993), a fact which fulfils Bandura’s (1999) observation that harming others is made easier when the suffering is not visible. This is reinforced by the general rule that such operations usually deny entrance to outsiders and rely on “ag-gag laws” to avoid major legal or social action that may hinder their practices. The unwillingness of the public to learn about such practices allows both parties to perpetuate the invisibility of the system.

Disguising the animal origin of the products serve a similar function, since consumers are generally unwilling to eat parts reminiscent of the live animal (Hoogland et al., 2005). This may be why white meats are drained of blood - a known disgust-eliciting cue (Kenyon & Barker, 1998; Santos & Booth, 1996), and parts associated with intelligence or personality - such as eyes or brains — do not feature prominently on the market. For many consumers, food simply ‘comes from the supermarket’: they have very limited knowledge of agriculture, its production processes, and the implications of their choices, nor a desire to learn (Verbeke, 2005).

Everyday agribusiness rhetoric also plays a role in concealing the animal origin of foods and softening the harsh realities of contemporary farming (Stibbe, 2001). Commodified, sanitised terms such as ‘livestock’ and ‘individual accommodations’ (referring to confinement facilities), as well as euphemisms (such as ‘pork’ instead of ‘pig’)
disguise the conditions under which farm animals are raised, and transform them into objectified commodities (Glenn, 2004). Heinz and Lee (1998, p. 86) argue that this is a form of commodity fetishism, which “removes the production process from the meaning of meat and, thereby, silences the slaughter of animals.” It also starkly resembles the cognitive and behavioural strategies of moral disengagement outlined in section 2.2. Making the link between food and animal salient elicits an almost universal disgust reaction (Fessler et al., 2003; Rozin et al., 1997), which results in a demonstrable reduction or even elimination altogether of meat consumption among consumers (Hoogland et al., 2005; Tawse, 2010; Tian et al., 2016). From the industry perspective, severing these symbolic ties in the eyes of the public between production and consumption therefore makes economic sense, as it serves to enable their ongoing practices with little public opposition.

Finally, consumer habits are greatly influenced by powerful corporate interests. The livestock sector has immense economic, political, and structural power, and this power influences consumer preference to the extent that marketers have cultural hegemony, which is to say, complete control over the values and beliefs of a culture (Gossard & York, 2003). Through social, psychological, and cultural manipulation, the industry can generate and maintain prevailing attitudes and the high consumption levels seen today.

2.3 Selective diets: hostility and issue fatigue

The psychological mechanisms and supply-side influences outlined in the preceding sections drive the consumption of meat and its entrenchment in our individual, societal, and cultural identities. The animal welfare approach is pitted against all of these. Although social acceptance of meat-free diets and those who practice them has gradually increased over time, they are still perceived negatively, namely as faddists, sentimentalists, or even extremists (Cole & Morgan, 2011). The threat of being morally judged by those who practice vegetarianism or veganism evokes rationalisation among omnivores to defend their practice (Rothgerber, 2014), which can lead to hostility towards the mere notion of dietary change. Dhont and Hodson (2014) argue that the endorsement of non-exploitive ideologies (such as veganism) may be experienced as a threat to traditional norms and dominant ideologies. For
this reason, animal welfare arguments for reducing meat consumption has resulted in issue fatigue and, for most individuals, are ineffective.

2.4 Animal agriculture in public discourse and communication

Psychological mechanisms that enable meat eating, combined with hostility towards “radical” plant-based diets, contribute to a very tentative handling of the issue within public discourse, one that is characterised by suppression, ambiguity, and sarcasm (Almiron & Zoppeddu, 2014). This tone trivialises and undermines what should be treated as a serious issue. As such, many studies identify a substantial knowledge gap among the public with regards to agriculture’s adverse environmental effects (Cordts, Nitzko, & Spiller, 2014; de Boer, Schösler, & Boersema, 2013; European Commission, 2010). Such research provides valuable insight into public thinking and highlights the need for further awareness.

2.4.1 Animal agriculture in the media

Communication through the media (newspapers, television, radio, the internet) is central to raising public awareness, fostering understanding, and promoting action when it comes to vital scientific issues. For example, for most people, knowledge of global warming is obtained primarily through media sources (Olausson, 2011; Zhao, 2009). However, media coverage of climate change has serious shortcomings, especially with respect to reporting the environmental consequences of diet, which is a principal cause of contemporary climatic problems. This media “blind spot” (Almiron & Zappeddu, 2014), that is, the severe underrepresentation of one of climate change’s principal causes, is worrying given the issue’s weight and importance, especially when considered considering topics conventionally garnering the most media attention (e.g., crime, sports, entertainment, etc.).

Several studies have demonstrated the weak dissemination of information regarding the link between diet and climate change. In the United States, environmental coverage in mainstream media is low (PEJ, 2009; PIEC, 2013), however the link between diet and climate change is even less salient. Only 2.4 percent of “climate change” articles in leading US newspapers mentioned agriculture’s contribution between September 2005 to January 2008.
(Neff, Chan, & Smith, 2009). Of these, just 13 percent mentioned livestock (representing only 0.48 percent of total articles analysed). These findings echo those of Kiesel (2010), which found that The New York Times addressed the meat-climate change connection only three times between the years 2006 to 2008. Similarly, Almiron and Zoppeddu (2014) reported that only 4 percent of articles in Spanish newspapers, between 2006 and 2013, called for the assessment of diet as a contributing factor to pollution.

Neff et al. (2009) suggest that a reason for this lack of media coverage may be the individualistic nature of responsibility surrounding the issue. Articles considered important and warranting coverage are generally those that are systemic, whereby the primary responsibility lies with the government, businesses, or other parties. Conversely, issues that emphasise individual responsibility are deemed less newsworthy; even less so if these concerns are invisible, long-term, and presented as uncertain (Marshall, 2014). Collectively, these factors promote a lack of response among individual, collective, and policy-based organisations, contributing to the media’s unwillingness to give the issue the coverage it deserves.

In the rare cases that media coverage does occur, articles addressing the problems of animal agriculture include dubious linguistic choice and tone. These are based largely around the use of irreverent language, puns, sarcasm, and metaphors that ‘soften’ the issue and create ambiguity and confusion (Freeman, 2009). Another prominent feature of these articles is that individual responsibility and action towards the problem is only cautiously implied (Freeman, 2010; Kiesel, 2010; Neff et al., 2009), again undermining the serious nature and necessity of dietary change.

2.4.2 Animal agriculture in environmental discourse

A similar pattern of infrequent and tentative handling of the meat-environment link can be found among the discourse of non-governmental environmental organisations (NGOs), a highly trusted information source for the public (Bailey et al., 2014; Cox, 2012). Where they do exist, messages by NGOs tend to advocate meat-reduction, viable
replacement alternatives (more sustainable meats) or, least commonly, the elimination of meat products altogether. However, calls for public action are fundamentally modest in nature. Messages are typically stringent when identifying the supply-side as the culprit, rife with criticism of industrial-scale farming and its environmental burdens. Messages for people to reduce their own individual intakes, however, are usually conveyed as voluntary, tentative, and moderate (Freeman, 2010; Laestadius, Neff, Barry, & Frattaroli, 2014). Although many organisations identified elimination of meat as the most sustainable option, this did not extend to a recommendation to eliminate meat; in fact, a small number of environmental NGOs publicly state that they are not encouraging the adoption of meat free diets, but rather that it is the consumer’s individual choice (Laestadius et al., 2014). Also notable is that, where NGO messages to reduce intake are found, they tend to constitute short statements on organisations’ websites and are rarely afforded large-scale or priority campaign attention.

The reasons for the minimal coverage and reluctant calls to individual action are largely centred around the cultural significance of meat and the unpopularity of messages advocating a meat-free diet. NGOs may be hesitant to promote any message that consumers “will not want to hear,” (see Bristow & Fitzgerald, 2011). This illustrates Freeman’s (2010) point, that the lack of attention devoted to the problem of meat consumption in public discourse may be due to the perceived pragmatic value as a “compulsory institutional norm,” (Kheel, 2004). This largely originates from the widespread hostility towards meat-free diets and those who practice them. Meat abstainers are negatively viewed and portrayed as radical, militant, extremists, and preachers, often provoking a defensive reaction among omnivores to the threat of being morally judged (Rothgerber, 2014). Fear of alienation or an erroneous portrayal of the organisation as “radical” is therefore likely to prompt reluctance among both the media and NGOs when it comes to advocating dietary change, much less acknowledging meat’s harmful environmental impact.

The animal agriculture industry has also been known to form strategic partnerships with environmental organisations, providing them with funding and support. The World Wildlife Fund, for example, collected almost $11 million in corporate donations in 2015
(World Wildlife Fund, 2015). One of their prominent donors is the American corporation Cargill, a business dealing in palm oil, energy, steel, and meat production. Cargill’s dubious reputation includes allegations of systemic deforestation, human rights violations, and a host of other transgressions leading to detrimental effects on the environment (see Astor, 2006; International Labor Rights Forum, 2005; “Meat processor fined,” 2007; Zink, 2004), all of which seemingly place them in direct conflict with the WWF’s central philosophy. Similar partnerships may exist among other environmental organisations and corporations, and may contribute to these groups’ lacklustre public disavowal of meat-free diets.

Related factors may explain the lack of policy attention given to meat consumption, with the issue of livestock being overlooked entirely in the Paris COP21 2015 summit and the United Nations Framework Convention on Climate Change (United Nations, 1992). Likewise, it was ignored altogether in the 2015-2020 Dietary Guidelines for Americans Report (U.S. Department of Health and Human Services [HHS] & U.S. Department of Agriculture [USDA], 2015a). Most tellingly, perhaps, is the fact that the scientific advisory report on which these guidelines were based included an entire chapter on sustainability and repeatedly recommended a reduction in meat intake (HHS & USDA, 2015b). This was omitted in the final report, which is what the public and the media ultimately see.

2.5 Public awareness gap

Though awareness of the link between meat production and the environment is steadily growing through the release and dissemination of exposés, such as Cowspiracy (2014) and Comfortably Unaware (Oppenlander, 2012), mainstream knowledge of the connection remains limited. The reluctance amongst the media and environmental advocacy groups to explicitly advocate meat-free diets, or even to address the link between diet and environment, contributes substantially to this knowledge gap. Although approximately 83 percent of people recognise the contribution of anthropogenic (i.e., man-made) climate change, an awareness of the livestock sector’s unique role in this problem remains markedly low (23 percent: de Boer et al., 2013; 32 percent: Cordts et al., 2014; 29 percent: European Commission, 2010).
A multinational study among business students revealed that livestock production was perceived to be a much less important cause of climate change than “people driving cars,” (Bostrom et al., 2012), consistent with the findings of Macdiarmid, Douglas, and Campbell (2016). Similarly, Tobler, Visschers, and Siegrist (2011) found that the environmental impact of meat was perceived to be lower than the environmental impact of plastic food packaging. It can be postulated that heightened awareness of other practices’ negative environmental effects, such as vehicular use and plastic packaging, may be due to the salient, visible nature of vehicle emissions and plastic discard. Conversely, the bulk of agricultural production occurs in remote areas away from the public eye. Of particular interest is the high level of concern given to damage occurring in the opposite direction, whereby 77 percent of people endorsed the view that the agricultural industry would suffer strongly from the effects of climate change (European Commission, 2010).

This awareness gap about the relationship between factory-farming and the environment is also meaningfully linked to indifference regarding dietary change. Findings by Bailey et al. (2014) indicate that consumers with a low awareness of a commercial sector’s contribution to climate change are less likely to show willingness to change their behaviour with respect to that sector. When awareness was increased, so too was willingness to alter individual behaviours. This implies that closing the public awareness gap seems a necessary precondition to spur meaningful behavioural action. Such results are supported by the findings of de Boer, de Witt, and Aiking (2016), however there is a notable lack of studies assessing the most effective way to address meat consumption among the public. This indicates a need for further research that can direct practitioners on how best to close the awareness gap and thus facilitate dietary behavioural change (Bailey et al., 2014).
3 On communication and framing

Research in cognition and environmental communication shows that how people frame an issue - that is, how they mentally organise and understand key ideas - has a large influence on their understanding of the nature of a problem, where the responsibility for that problem lies, and what action should be taken (Maibach, Nisbet, Baldwin, Akerlof, & Diao, 2010). Framing devices are also used in communication as “interpretive storylines,” giving greater weight to certain elements over others and making connections between two important concepts salient (Nisbet, 2009). In this way, frames work implicitly to suggest what is relevant about an issue, and what should be discounted (Ferree, Gamson, Gerhards, & Rucht, 2002). Fundamentally, communicative framing involves tailoring messages to the existing values, attitudes, and perceptions of different audiences to make complex information understandable, significant, and personally relevant (Lakoff, 2010; Nisbet, 2009).

3.1 Styles of framing

The way in which a story is told is an important and inevitable determinant in how the message is received, as well as how the information contained in the message is interpreted. Using novel information to communicate an issue, specifically in ways not usually considered, is a potentially powerful resource for science communicators looking to instigate change. A study by Maibach et al. (2010), for example, adopted the novel and lesser-known frame of climate change as a public health issue. Much like the environmental impacts of animal agriculture, the role of climate change on human health and wellbeing receives minimal media attention, leading to a similar knowledge gap in the general population. Participants were given an essay on the subject and were asked to highlight sections they found particularly helpful or unhelpful. The results revealed positive reactions to the essay as a whole, suggesting that the communication of previously unknown information, or an unconsidered frame of reference, is a potentially powerful tool in facilitating attitudinal change.
Of important note is the effectiveness of gain- versus loss-framing. Maibach et al. (2010) found that information about mitigation benefits (e.g., healthier air for children and adults to breathe) was rated more favourably than information about public health-related threats if no mitigation occurs (e.g., children will become more likely to develop asthma). Studies on the relative effectiveness of gain-framing (i.e., emphasising positive motivations or benefits of an issue) and loss-framing (i.e., emphasising the negative sacrifice or threats of an issue) have yielded mixed results, and Cheng, Woon, and Lynes (2011) argue that it is often the interplay of gain- and loss-framing that determines behavioural response. Davis (1995) found that loss-framing is more effective than gain-framing in the promotion of pro-environmental behaviour when the issue is low salience (where salience can be interpreted as ‘perceived importance’ [Obermiller, 1995]). The loss-frame is also more effective than the gain-frame when the issue is self-referencing (where the message describes how the behaviour affects the recipient only [Loroz, 2007]). When a message is both low-salience and self-referencing, the loss-frame evokes negative emotions, such as disgust and fear, which in turn trigger avoidance behaviours (see Dienstbier, 1978).

Findings by Horne, Powell, Hummel, and Holyoak (2015) demonstrate the effectiveness of the loss-frame in countering the anti-vaccination movement. In that study, the researchers educated those that held anti-vaccination attitudes of the risks involved with failing to vaccinate their children (i.e., loss-framing). In many ways, the anti-vaccination movement parallels animal agriculture. “Anti-vaxxers” have strong beliefs that vaccinations cause autism and refuse to vaccinate their children on those grounds. Similarly, most omnivores defend their consumption of meat despite a plethora of evidence of — and their innate aversions to — animal suffering. Anti-vaxxers also have feelings of strong hostility towards the notion of mandatory vaccination, as do many meat-eaters towards the threat of “forced” dietary change. Horne et al.’s (2015) study suggested that educating people about the risks posed by failing to vaccinate, as opposed to disproving the link between autism and vaccinations (which have been shown to backfire among certain individuals: see section 3.3.4 for further discussion), reduced anti-vaccination attitudes. This approach may be adapted to the question at hand, such that individuals are informed about the significant environmental risks associated with failing to adjust their current diets.
Conversely, studies by Maibach et al. (2010) and Gifford and Comeau (2011) demonstrate the effectiveness of the gain-frame, which is generally more effective for high salience issues (Obermiller, 1995) and those which are self-other referencing, (where the message describes how the behaviour affects the recipient as well as others, such as children or the community [Loroz, 2007]). Moser (2010) attests that messages that increase worry, concern, or fear should be accompanied by information that allows the audience to translate these negative feelings into positive action. In the study by Maibach et al. (2010), this was represented by the information about climate-change mitigation benefits. Tellingly, sentences in the same study about reducing meat consumption as a mitigating measure for climate change were rated less favourably than information about other mitigating measures (such as changes in energy use or transportation), reflecting the general aversion for dietary change described in section 2.3.

Despite their differential results relating to gain- versus loss-framing, both Maibach et al.’s (2010) and Horne et al.’s (2015) respective studies were effective in that they broadened personal relevance, locality, and urgency associated with the issue. The former worked by exposing participants to likely connections between already familiar health problems in the individuals’ own communities, and the latter by providing the audience with information illuminating the high rate of disease in children who are not vaccinated. Moser (2010) argues that making an issue personally relevant is imperative to facilitate engagement and social action. Similarly, Marshall (2014) stresses the importance of engaging the emotional brain with evocative stories rather than merely reciting facts and figures (which, he reasons, stimulates the rational brain but is unlikely to provoke a behavioural response).

Wilson (2006) also demonstrated the effect of emphasising personal relevance in promoting actual behavioural change using the moral frame. Wilson framed climate change as a moral issue, advocating for environmental stewardship as a sort of religious duty. In this way, the author engages an otherwise peripheral demographic – spiritual leaders and religious followers – who may otherwise be disinterested (or see no role for themselves) in the issue. Emphasising personal relevance whilst framing an issue in terms of moral values
(Lakoff, 2010) is in fact a highly effective framing device whether the intent is to change attitudes or generate action (Nisbet, 2009). Rozin et al. (1997) argue that the likelihood of “moralisation”, the acquisition of moral qualities by a previously morally-neutral object or activity, seems to increase if the offending activity causes harm to children. The idea of communicating issues as a moral duty to protect innocent others (including children and future generations) is also discussed by Harré (2011), who argues similarly for the utility of making issues personally relevant and appealing to the emotional brain.

Despite the evidence for framing effectiveness, not all individuals are equally susceptible. In fact, receptivity is variable not only according to demographic factors (such as sex: see Zelezny, Chua, & Aldrich, 2000) but also an individual’s position within the transtheoretical model of behaviour (Prochaska, DiClemente, & Norcross, 1992, Figure 3.1). This model describes the different stages of consciousness that individuals traverse before deciding to adopt a given behaviour (Pelletier, Lavergne, & Sharp, 2008), and operates on the assumption that it is not attitudes that drive behaviour; rather attitudes drive behavioural intention, which in turn shape our actions (called the Theory of Reasoned Action: Ajzen & Fishbein, 1980). Prochaska et al. (1992) have operationalised the transtheoretical model into five stages of change (*precontemplation, contemplation, preparation, action, & maintenance*), which depend on the individual’s level of intent and their conscious attitudes towards the behaviour (Pelletier et al., 2008; Prochaska et al., 1992). At the precontemplation stage, individuals do not recognise a need for, or are not actively

![Figure 3.1. The transtheoretical model of behaviour (see Prochaska et al., 1992).](image-url)
considering change. The contemplation stage is characterised by the recognition of a problem and a consideration of change. Individuals prepare for change in the preparation stage, initiate change in the action stage, and develop new skills and behaviours to maintain change in the maintenance stage. At any point, individuals may exit the cycle permanently or relapse to an earlier stage.

3.2 Potential of the environment frame

Animal agriculture has traditionally been framed, both mentally and communicatively, as an animal rights or welfare issue. However, for the many reasons outlined in Chapter 2, this tends to result in denial, defensive mechanisms, and issue fatigue, in turn contributing to a lack of serious or sustained engagement needed to induce action on a global scale. By contrast, promoting dietary change for environmental reasons is a relatively novel approach at the level of public discourse and policy (Carlsson-Kanyama & González, 2009), and presents a promising opportunity given that most people are concerned – to some degree – about the integrity of the natural environment (e.g., Dunlap, Gallup, & Gallup, 1993). Research indicates that environmental concerns are not an initial motivator for dietary shift among vegetarians and vegans, but often becomes a strong motivator for maintaining such diets long-term (i.e., after dietary shift has already occurred) (Fox & Ward, 2008). This may be due to the lack of mainstream coverage the issue garners and the resultant awareness gap. Reframing animal agriculture as an environmental issue (i.e., presenting a novel frame of reference for consideration: see section 3.1), may help to promote a substantive public dietary shift by generating the level of engagement needed for policy action and societal change.

Consumer information as an instrument to reduce meat consumption is characterised by a low depth of intervention in market processes, and is much easier (and less costly) to implement compared to other policy measures. Therefore, increasing awareness by providing consumers with information may be considered an important precondition for building acceptance of more invasive measures, such as financial incentives
(e.g., meat taxes) and regulatory measures (e.g., prohibitions: Dagevos & Voordouw, 2013). In a study communicating different forms of negative meat impacts (i.e., health, animal welfare, environment, & personal image), Cordts et al. (2014) found that those who read any of these four articles were more likely to express an intention to reduce future meat consumption than those who did not read an article. Therefore, communication alone may be considered an effective instrument for campaigns aiming to reduce meat consumption, and may also facilitate progression within the transtheoretical model of behaviour.

The environmental impacts of contemporary animal agriculture are broad and varied. Different environmental issues may therefore vary in relative effectiveness and reception, depending on individual preferences, values, or beliefs. For instance, information about animal agriculture’s role in climate change may be received positively by those who are concerned about climate change. However, for those who are indifferent or uncertain about climate change, information about animal agriculture’s role in wild species extinction may be particularly poignant, especially to those who value wild animals. This could be due to several overlapping reasons, including the appeal of charismatic wild species (such as large cats and apes, both of which are negatively affected by animal agriculture through habitat loss and human eradication) and the relatively ambiguous perceived effects of climate change. In fact, several studies have assessed public response to the meat-climate change link (i.e., independent of other environmental or value-based concerns). Some (e.g., de Boer et al., 2013) have demonstrated that isolating the meat-climate change link may be ineffective in reducing meat intake, especially in those that are sceptical about climate change. However, other scholars report a negative association between environmental awareness (including that of climate change) and meat consumption (e.g., Cordts et al., 2014), suggesting that empirical findings in this area are yet inconclusive.

Invoking morality by framing reduced meat consumption as a moral responsibility to the environment, other human beings, and future generations, may be another effective strategy resulting in more amenable social consumption patterns (Cohen et al., 2011; de Bakker & Dagevos, 2011). This is because the moral frame would present unconventional victims not thought to be previously involved.
Although the environmentalist argument for encouraging dietary change holds clear potential, it also comes with its own set of challenges, some of which overlap with those faced by proponents of animal-welfare based arguments. As we will see, many of these challenges are grounded in the symbolic and cultural significance of meat in modern society.

3.3 Challenges of the environment frame

Like the animal-welfare approach, it is entirely possible that people learning of the environmental impacts of animal agriculture will express the same suite of denial mechanisms or a gap between their attitudes and behaviours. Similar effects have already been observed in several studies. Stoll-Kleemann, O’Riordan, and Jaeger (2001) demonstrate that, while a low-energy dependent future is highly desirable, the majority of citizens are still unprepared to take personal actions necessary to achieve this. This attitude-behaviour discrepancy may act to assuage guilt and justify continued consumption, especially since attitudes usually reflect a societal norm whereas behaviour rests with individual responsibility. The following subsections outline a range of psychological and social strategies used by everyday people to reduce cognitive dissonance as it relates to the harmful anthropogenic effects on the environment (mostly, climate change).

3.3.1 Denial of responsibility

Denial of individual responsibility and one’s personal role in the problem at hand factors prominently into an unwillingness to commit to, or even consider, behavioural change. Stoll-Kleemann et al. (2001) outlined several ways in which such a denial of responsibility typically manifests using prototypical statements:

- **Metaphor of displaced commitment** – “I protect the environment in other ways.”
- **To condemn the accuser** – “You have no right to challenge me.”
- **Denial of responsibility** – “I am not the main cause of this problem.”
- **Rejection of blame** – “I have done nothing so wrong as to be destructive.”
- **Ignorance** – “I simply don’t know the consequences of my actions.”
• **Powerlessness** – “I am only an infinitesimal being in the order of things.”

• **Fabricated constraints/comfort** – “There are too many impediments/It is too difficult for me to change my behaviour.”

• **‘After the flood’** – “What is the future doing for me?”

Each of these categories holds a degree of ambiguity in their interpretation. The ignorance tactic may be either unintentional or wilful, as evidenced by Knight et al. (2003), and the powerlessness tactic may be applied as a response either to the problem itself, or to the feasibility of solutions and perceptions of consumer effectiveness (see section 3.3.3). All of the foregoing devices, however, seem to evoke the *tragedy-of-the-commons* as an underlying theme:

> In *tragedy-of-the-commons* situations, behaviour that makes sense from the individual point of view, when repeated by enough individuals, ultimately proves disastrous to society ... Each individual gains, financially or otherwise, by consuming the natural resource. Each, furthermore, sees little harm in doing so since the resource is so huge in size and their impact on it is so small.

(Gardner & Stern, 1996, p. 23)

In other words, denial of responsibility translates to people believing that protecting the environment is a responsibility that lies with governments and businesses, rather than with them as individuals (Neff et al., 2009). The bystander effect, detailed in section 2.2.1, may also be applied here, whereby individuals probably expect governmental intervention or policy implementations if the environmental impacts of the industry are as severe as they are made out. Allocating moral responsibility to these other parties (and essentially placing one’s faith in complex bureaucracies with vested interests) is a common strategy as evidenced by the findings of Hares, Dickinson, and Wilkes (2010), and Stoll-Kleemann et al. (2001). However, as discussed in section 1.4, such regulated solutions are insufficient to curb the effects of global temperature rise, making individual responsibility essential.
Even if responsibility is deferred to a managerial or governmental position, a fundamental paradox arises when considering the value placed on individual rights, which occurs predominantly in developed, market-based economies. An implicit expectation for an effective policy or managerial fix that addresses the problem of climate change (and other forms of environmental degradation) competes against cherished notions such as freedom of choice, alongside largely unfavourable attitudes towards the prospect of governmental interference in personal affairs (Kempton, Boster, & Hartley, 1995).

3.3.2 Tangible costs, intangible benefits

Unwillingness to change engrained habits due to the cost to self (versus benefit to others) is a common justification for continued consumption, especially when considering environmental issues such as climate change. Climate change is invisible in nature, and there are substantial temporal and geographical distances between its causes and effects (Marshall, 2014; Moser, 2010). In fact, no individual alive today will see Earth’s climate return to its pre-industrial state in terms of greenhouse gas concentrations and temperatures (Solomon, Plattner, Knutti, & Friedlingstein, 2009). That even collective, mass change will still come with a lag in tangible benefits makes it difficult for individuals to see an urgent need for, say, changing their dietary habits.

People’s wariness of important environmental issues such as climate change may have roots in our species’ evolved psychology, expressed succinctly in the oft-quoted principle that “our modern skulls house a Stone Age mind,” (Cosmides & Tooby, 1997, Principle 5). In other words, human brains evolved to respond and react to tangible problems that are personal, abrupt, morally relevant, and present imminent danger. The most pressing environmental problems, by comparison, do not offset most of these triggers, given that they are evolutionarily novel, multi-causative, temporally distant, invisible, and impersonal. The “immoral” trigger, however, has unique potential for shaping how environmental communication may best be framed (see discussion in section 3.1).
Furthermore, although many people express concern over climate change, most have limited knowledge of the exact causes and the underlying science (Reynolds, Bostrom, Read, & Morgan, 2010), which could be a consequence of the perceived uncertainty in the scientific community (Stoll-Kleemann et al., 2001). Consequently, many people find it difficult to relate to or support possible policy solutions. In reality, however, any uncertainty about the man-made causes of climate change is limited to a small fraction of climate scientists; these sceptical views are often augmented in the name of “journalistic balance” (or, presenting both sides of an issue equally). Not only has this informational bias allowed governments to delay action by encouraging ongoing debate (Boykoff & Boykoff, 2007), it has also planted doubt in the minds of the public who are already sensitive to vagueness and uncertainty (Morton, Rabinovich, Marshall, & Bretschneider, 2010). In their study on air-travel behaviours, Higham and Cohen (2011) demonstrate the widespread belief that socially embedded behaviours are “too important to be curtailed by abstract and uncertain concerns about climate change,” (p. 104). This is also likely to be the case with meat consumption. Since trust and credibility are especially powerful predictors when it comes to message effectiveness (Cordts et al., 2014), perceived scientific uncertainty severely inhibits communication campaigns of this nature.

### 3.3.3 Perceived Consumer Effectiveness

Perceived Consumer Effectiveness (PCE) is the extent to which consumers believe that their personal efforts can contribute to the solution of a problem. It is an important precursor in the motivational path of pro-environmental behavioural change. In this regard, individuals employ a cost-benefit analysis, whereby they will help if the total benefit exceeds the cost of helping (Batson, 1987). An individual’s perceived benefit is determined by their PCE, and indeed various studies have indicated that PCE must be high to sufficiently translate positive attitudes into purchase decisions (Berger & Corbin, 1992; Ellen, Weiner, & Cobb-Walgren, 1991).

Related to this, Vermeir and Verbeke (2006) demonstrated that communication about the benefits of sustainable consumption results in heightened personal relevance attached to
sustainability. This is reminiscent of the arguments stressing the importance of emphasising both motivational benefits (Gifford & Comeau, 2011; Moser, 2010) and personal relevance of an issue (Harré, 2011; Moser, 2010; Scheufele & Tewksbury, 2007). Not only is a higher PCE associated with more sustainable food choices, it also encourages pro-animal-welfare behaviour (Vanhonacker & Verbeke, 2009) and is positively influenced by education and communication. Since 69 percent of American adults do not believe that the personal actions of individuals can have any effect on climate change (Leiserowitz et al., 2015), this presents interesting opportunities for science communicators.

3.3.4 Perceived agenda and political entanglement

In some areas of the world, environmental issues have become entrenched in political alignment or perceived agenda, resulting in polarised attitudes and politicised viewpoints. In North America, where such polarization is prominently displayed, “right-wing conservatives” are seen as holding strong ideals of individual freedom, private property rights, and the promotion of free markets, among others. Conversely, “left-wing liberals” are perceived as endorsing collective rights, governmental intervention to extend rights, and market regulation. Many strategies of environmental protection involve regulations or restrictions on markets, industries, and properties, which places the issue in opposition to traditional conservative values (McCright & Dunlap, 2011). As such, conservatives may dismiss environmental protection as left-wing, anti-capitalist conspiracy. In fact, evidence clearly shows that self-identified liberals hold a significantly more pro-environmental stance than their conservative counterparts (Dunlap, Xiao, & McCright, 2001).

A politically-determined position on environmental issues is perhaps most common with the problem of climate change, as the supporting scientific body of knowledge highlights (and calls for a reduction of) the damaging consequences of industrial capitalism and sustained economic growth. These are key goals of the conservative worldview. Polls have revealed a deep, partisan division between conservatives (who question the validity and dismiss the urgency of climate science) and liberals (who accept it, often to the point of
expressing serious concern) (Dunlap & McCright, 2008). This ideological split remains robust even after factoring in unbiased, scientific information (Malka, Krosnick, & Langer, 2009), suggesting that climate change has become one of the issues defining political alignment (Nisbet, 2009). This established party view about the environment makes it as difficult to change a person’s attitudes and beliefs as it is to get them to change their political affiliation. The effect is similar with regards to the meat-reduction message, whereby “government intrusion” into people’s food choices may be seen as inhibition of individual freedoms, and thus dismissed as a political ploy.

Those who are wary of hidden agendas are thus prone to a ‘backfire effect’, whereby presenting scientific information or evidence only leads them to form stronger opinions countering the message. This has been observed both in anti-vaccinators (Nyhan, Reifler, Richey, & Freed, 2014) and those who hold strong views against stem-cell research (Ho, Brossard, & Scheufele, 2008). It is also likely to be the case for other controversial issues that encourage a motivated partisan split, such as the question of meat-eating. Such backfire effects directly contradict the ‘scientific literacy model’, which assumes that the dissemination of relevant, scientific information will be willingly sought by the public, leading to greater scientific knowledge, increased support for scientific research, and thus more knowledgeable judgments about scientific issues (Miller, 2004). Instead, backfire effects suggest that heuristic cues, such as value-based predispositions, are much more formative in judgments of scientific issues. This effect seems to be particularly common among individuals that hold strong, long-term beliefs (such as religious views) which filter their view of relevant empirical evidence, and results in a biased examination (Lord, Ross, & Lepper, 1979). Therefore, the current study, which seeks to investigate the response to the environment frame as applied to animal agriculture, may yield similar results to those of Nyhan et al. (2014) and Ho et al. (2008) whereby information about the environmental impacts of meat production may backfire among those that identify as pro-meat in belief, pushing them further into their established ideology.

Even without political affiliation hindering change, similar hurdles are found in our current consumer society, one that is steeped in economic freedom and market criteria
dependent on instant consumption, instant gratification, and instant profit. This entrenched lifestyle norm is enough for people to resist change, prompting some scholars to suffer from “consumerist pessimism” and proclaim that consumers should be viewed as enemies, or at least obstacles, to sustainability (see Bauman, 2009).

3.4 The present study

As per the research gap identified in section 2.5, the purpose of the current study was to explore how American adults respond to an essay about animal agriculture framed as an environmental issue.

3.4.1 Research questions

Specifically, the study aims to answer three research questions:

1. Does an environmentally-framed essay about animal agriculture provide new information?
2. Does an environmentally-framed essay about animal agriculture provide valuable information? (attitudinal)
3. Does an environmentally-framed essay about animal agriculture induce behavioural change? (behavioural)

Research question one will be based on a single dependent measure: an explicit question assessing whether the information contained in an essay about the environmental impacts of animal agriculture is novel (i.e., something that participants had not encountered before). Research question two will be based on four dependent measures: an explicit question assessing the value of the information in the essay; the overall valence of the participant comments made after reading the essay; a composite score based on respondent reactions to the essay as a whole; and the self-identification into four discrete groups concerning the participant’s attitudes and beliefs about meat and diet. Research question three will be based on four dependent measures: an explicit question assessing whether the
essay made participants (re)consider their own diets; an explicit measure of meal choice selection; an implicit measure of meal choice latency; and an implicit measure of choice click-count. See section 4 for more details surrounding these measures.

In addition, a review of the qualitative comments made after reading the essay was also conducted to gain a more general view of essay reaction. Qualitative comments were assessed using a general inductive approach in section 6.4.

3.4.2 Development of hypotheses

Previous findings identify an extreme knowledge and awareness gap among the public pertaining to the environmental impact of meat production (Cordts et al., 2014; de Boer et al., 2013; European Commission, 2010) and that heightened awareness coincides with behavioural change regarding industrial sectors and consumption of their products or services (Bailey et al., 2014). Based on this evidence, an environmentally-framed essay about animal agriculture was hypothesized to be new (H1) and valuable (H2) for participants. The third hypothesis (H3) is based on the assumption that attitudes are not reliable predictors of behaviour (i.e., market-place choice: Bailey et al., 2014; Kraus, 1995) which commonly results in an attitude-behaviour disconnect. Given this, H3 predicts that the results of the behavioural measures will differ between control (no essay) and experimental (essay) conditions, but to a lesser extent than those of the attitudinal measures.
4 Method

4.1 Study Participants

In June, 2016, adults (n = 412) living in the United States were recruited from Amazon Mechanical Turk, an online crowdsourcing website that has been found to yield valid and reliable data (Buhremester, Kwang & Gosling, 2011). Of these, four participants were excluded from analyses after they submitted irrelevant and/or nonsensical responses, leaving a final sample of 408 participants (222 female; M_age = 36.40, SD = 12.40).

After being given a set of four different categorical descriptions and asked to choose the one that best matched their personal feelings about meat consumption (see Table 4.1 for full category descriptions), 105 (47 female; M_age = 32.89, SD = 10.91) identified as pro-meat; 121 (58 female; M_age = 37.42, SD = 12.21) self-selected the disinterested category; 154 (95 female; M_age = 36.95, SD = 12.42) saw themselves as concerned; and 28 (22 female; M_age = 42.20, SD = 15.30) identified as being anti-meat. To control for possible order effects, half of all participants classified into one of these four groups at the start of the survey, and the remaining half at the end, for both control and experimental conditions. Since differences were found in respective meat-attitude proportions between those who self-classified after reading the essay versus those who self-classified before, or without reading the essay, meat-attitude group self-classification became a fourth dependent measure for research question two.

4.2 Materials and Procedure

4.2.1. The environmentally-framed essay

Based on the study design by Maibach et al. (2010), participants were randomly assigned either to the essay (experimental) condition (n = 183) or to the no-essay (control) condition (n = 225). In the experimental condition, participants were asked to read an

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1 Participants were not shown category labels (e.g., “pro-meat” or “concerned”) and chose based on category description alone.
Table 4.1
*Descriptions of meat-attitude groups for participant self-classification.*

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pro-meat</td>
<td>I eat meat and I have no problem with doing so. I have zero interest in reducing my meat consumption.</td>
</tr>
<tr>
<td>Disinterested</td>
<td>I eat meat and I don't really think about where it comes from. I have little interest in reducing my meat consumption.</td>
</tr>
<tr>
<td>Concerned</td>
<td>I eat meat but I am concerned about some aspect of it. I am interested in reducing my meat consumption.</td>
</tr>
<tr>
<td>Anti-meat</td>
<td>I refrain from consuming meat. I believe that humans should not eat meat.</td>
</tr>
</tbody>
</table>

original, one-page essay about animal agriculture (see Appendix I). The essay was “environmentally framed,” meaning that it included empirically supported information about the various threats posed to the natural environment by the meat industry (e.g., the sector’s contribution to pollution, climate change, deforestation and wild species extinction). Following this negative information, the essay discussed the beneficial effects of taking action by restricting (or eliminating altogether) industrial-scale meat production and also reducing personal meat consumption among members of the population. The essay concluded by stressing the moral importance of ameliorating the environmental problems caused by factory-farming operations. Those participants randomly assigned to the control condition, by contrast, did not read this or any other essay.

While reading the essay, participants were given a “highlighting” task in which they were prompted to identify any specific aspects of the essay they found to be particularly helpful or unhelpful. This highlighting task was enabled using the “hotspot” feature of Qualtrics, the survey-application software programme used for this study. Participants were instructed to mark sentences as helpful by clicking once (which highlighted the sentence in
green) and sentences as unhelpful by clicking twice (thereby highlighting the given material in red). After reading the essay in full, participants were given an opportunity to share their overall reaction to the information in the form of an open-ended narrative response by typing in a character-unrestricted text box. Finally, three additional Likert questions were designed to gauge the extent to which the information in the essay was perceived by the participants as new, valuable, and made them (re)consider their own diets.

4.2.2. Implicit and explicit behavioural meal tasks

Upon entering overall reaction to the essay, all participants were presented with a behavioural meal choice task (those participants in the control condition proceeded directly to this task either after completing the meat-attitude group self-classification task, or as their first task before completing the meat-attitude group self-classification task). For this task, a series of six labelled meat vs. vegetarian colour images of comparable meal choices (e.g., meat vs. vegetarian lasagne; cauliflower vs. chicken “buffalo bites”, etc.) were presented on-screen, appearing as one pairing at a time on individual survey pages. Participants were instructed to indicate their preferred meal choice between the two images depicted (see Appendix I).

In addition to explicit responses on this six-item meal task, each forced choice was assessed for participants’ latency of decision-making. Assuming the hesitancy (or deliberation) between choosing the meat and vegetarian options reflected underlying cognitive dissonance, this implicit timing measure served as a real-world proxy for the "meat paradox" facing consumers. Number of “clicks” (i.e., changing one’s mind from an initial meal choice to the other, and so on) for each forced-choice item was also treated as a possible indicator of cognitive dissonance, since such behavioural vacillations between the meat and vegetarian options may represent ambivalence. Those participants randomly assigned to the control condition completed the meat-attitude self-classification and meal tasks only, and there was no essay, or related tasks. See Table 4.2 for an overview of the analysis tools per research question.
<table>
<thead>
<tr>
<th>Research Question</th>
<th>Dependent measures</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Does an environmentally-framed essay about animal agriculture provide <strong>new</strong> information?</td>
<td>Likert question: <em>This essay provided new information.</em></td>
<td>Descriptive statistics (relative proportions) &amp; one-sample t-test</td>
</tr>
<tr>
<td>2. Does an environmentally-framed essay about animal agriculture provide <strong>valuable</strong> information? (attitudinal)</td>
<td>Likert question: <em>This essay provided valuable information.</em></td>
<td>Descriptive statistics (relative proportions) &amp; one-sample t-test</td>
</tr>
<tr>
<td></td>
<td>Essay valence (general reactions)</td>
<td>Statistical analysis of quantitative results (nonparametric Kruskal-Wallis, Mann-Whitney, Wilcoxon signed rank tests)</td>
</tr>
<tr>
<td></td>
<td>Composite essay score</td>
<td>General inductive qualitative analysis</td>
</tr>
<tr>
<td></td>
<td>Meat-attitude group classification</td>
<td></td>
</tr>
<tr>
<td>3. Does an environmentally-framed essay about animal agriculture induce <strong>behavioural change</strong>? (behavioural)</td>
<td>Likert question: <em>This essay made me think more about my own diet.</em></td>
<td>Descriptive statistics (relative proportions) &amp; one-sample t-test</td>
</tr>
<tr>
<td></td>
<td>Explicit meal choice selection</td>
<td>Statistical analysis of quantitative results (nonparametric chi-square, Mann-Whitney tests)</td>
</tr>
<tr>
<td></td>
<td>Implicit meal choice latency</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Implicit meal choice click-count</td>
<td></td>
</tr>
</tbody>
</table>
4.3 Coding criteria

4.3.1 Essay valence and qualitative response

To evaluate the participants’ general reactions to the environmental essay, a mixed-factorial analysis of the qualitative and quantitative data was adopted. For the qualitative dimension, each statement of the respondents’ (optional) open-ended responses to the essay was coded by “theme” or prominent construal (see Table 4.3). This resulted in the emergence of seven discrete categories: Denial (of personal responsibility), Biased (perceived alarmist tone), Critique (of style, tone, or credibility), Negative (evocation of emotions such as fear, doubt, worry), Novel (surprising, new, or previously unconsidered information), Interesting (well-written, positive response to the information), and Reflects POV (general agreement). These categories were assessed with respect to the four meat-attitude groups (see Table 5.3: Results), and are analysed further in Discussion section 6.4. A general inductive approach was deemed most useful for this aspect of the study design because it allows for the identification of key themes, which can then guide discussion of core meanings and recurring perceptions evident in the comments (Thomas, 2006). This was deemed more effective than a grounded theory approach, since the observed comments vary in nature and lack a unifying general theory (Thomas, 2006).

The overall valence (i.e., the intrinsic attractiveness or aversiveness) of the participant’s general response to the essay was the second of the quantitative dependent measures for research question two. Valence was assessed by rating each statement in the response as either -1 (entirely negative comments); 0 (mixed, including both positive and negative comments); or +1 (entirely positive comments): see Table 4.4 for examples of valence criteria.

2 Given that the textual coding was carried out by a single coder (the primary author), it is possible that some degree of researcher bias may have occurred (see McComas & Shanahan, 1999). However, it is worth acknowledging the benefit of internal consistency in the interpretation of qualitative comments and their categorisation into themes, brought by a single coder. This is arguably a priority in the present study, which is primarily concerned with the relative prominence of themes, as opposed to quantifying their absolute values.
Table 4.3

*Thematic categories used to code respondents’ general reactions to the essay.*

<table>
<thead>
<tr>
<th>Theme</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denial of responsibility</td>
<td>Remarks evoked denial of personal responsibility, including the metaphor of displaced commitment (e.g., “I do other things to help the environment without changing my eating habits.”) or the attitude-behaviour gap (e.g., ”I generally agree, but I am also not persuaded to change my eating habits.”)</td>
</tr>
<tr>
<td>Biased and/or alarmist</td>
<td>Remarks indicate that the essay was written from a biased point of view or that the intention of the essay was to unjustly alarm the reader. Some remarks included allusions to perceived political entanglement (e.g., “This is another joke of the government to scare us into conforming to their &quot;ways&quot;.), vegan/vegetarian agenda (e.g., “Just another vegetarian trying to force their beliefs and lifestyle on others.”), or denial of the scientific information on which the essay was based (e.g., “Global warming otherwise known as climate change does not exist...Humans do not cause climate change.”)</td>
</tr>
<tr>
<td>Critique of style/credibility</td>
<td>Remarks indicate that the essay was written poorly or did not provide adequate evidence to support the claims made (e.g., “I’m having a hard time believing this...Maybe if there was more support or facts to back it up.”)</td>
</tr>
</tbody>
</table>
| Evoked negative emotions     | Remarks indicate the essay prompted negative feelings such as despair, fear, guilt, worry, or alarm (e.g., “The article made me slightly sad...”)}
<table>
<thead>
<tr>
<th>Novel</th>
<th>Remarks indicate that the information contained in the essay was new, surprising, or not previously considered (e.g., “I didn’t know that raising livestock is causing deforestation and other negative environmental outcomes.”)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interesting/well-written (Interesting)</td>
<td>Remarks express that the essay was soundly written, interesting, informative, or sparked some self-reflexive thought processes (e.g., “I found this essay to be interesting...It made a difference to the way I look at it now.”)</td>
</tr>
<tr>
<td>Reflects Personal Point of View (Reflects my POV)</td>
<td>Remarks express agreement with the information contained in the essay. (e.g., “I totally agree with this essay.... There are a lot of issues going on with our environment, and humans are a primary reason why.”)</td>
</tr>
<tr>
<td>Not Applicable (N/A)</td>
<td>Remarks fell outside any of the above themes.</td>
</tr>
</tbody>
</table>
Table 4.4
Valence of participant comments made in response to reading the essay.

<table>
<thead>
<tr>
<th>Valence criterion</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entirely negative comments that demonstrate a negative reaction to the material (scored -1)</td>
<td>“It’s hooey, there is not a problem with meat production. The farmers thrive on us meat eaters. This is another joke of the government to scare us into conforming to their &quot;ways&quot;.”</td>
</tr>
<tr>
<td>Mixed positive and negative comments that demonstrate a mixed reaction to the material (scored 0)</td>
<td>“That we need to eat less meat to help with the environment. I generally agree, but I am also not persuaded to change my eating habits.”</td>
</tr>
<tr>
<td>Entirely positive comments that demonstrate a positive reaction to the material (scored 1)</td>
<td>“I was not aware of some of the issues that were raised in the essay. While I don’t eat a lot of meat, after reading this article, I will look at possibly reducing the meat consumption in my home.”</td>
</tr>
</tbody>
</table>

4.3.2 Composite essay score

To code participants’ sentence-specific essay ratings, sentences marked as ‘liked’ (i.e., indicating “particularly helpful”) were scored +1, sentences marked as ‘disliked’ (i.e., indicating “particularly unhelpful”) were scored -1, and unmarked sentences (i.e., indicating neither helpful or unhelpful) were scored 0. An average composite score for the entire essay was created by summing the sentence scores for each participant, dividing by the number of respondents per meat-attitude groups and then comparing across this subject variable.
4.4 Quantitative data analysis

Quantitative data was analysed using Graphpad Prism 7. Descriptive statistics (percentages, graphs) were performed using a combination of Microsoft Excel and Graphpad Prism 7.

4.4.1 Novelty measure of response to the environment frame

The single dependent measure, being the relative levels of agreement and disagreement to the statement, *This essay provided new information*, was assessed using a one-sample t-test.

4.4.2 Attitudinal measures of response to the environment frame

The first attitudinal dependent measure, being the relative levels of agreement and disagreement to the statement, *This essay provided valuable information*, was assessed using a one-sample t-test.

To test for meat-attitude group differences in the second and third attitudinal dependent measures — overall reactions (valence) to the essay and composite essay scores — the nonparametric Kruskal-Wallis test was used. To identify differences between all six pairs of meat-attitude groups (i.e., anti-meat & concerned; anti-meat & disinterested; anti-meat & pro-meat; concerned & disinterested; concerned & pro-meat; and disinterested & pro-meat), the nonparametric Mann-Whitney test was used. The Mann-Whitney test was also used to identify any differences in sex or before & after conditions for both dependent measures.

To test if the median response to the essay on both essay valence and composite score measures were greater than 0 (i.e., a positive reaction), the Wilcoxon signed rank test was used. Finally, for both dependent measures, the Wilcoxon signed rank test was used to test the hypothesis that all four meat-attitude groups would respond positively to the essay:
the null hypothesis was that the median score would not differ from zero (where zero represents a neutral response).

For the final dependent measure, meat-attitude identification, Mann-Whitney tests were used to assess any differences between sex, or between before & after conditions.

4.4.3 Behavioural measures of response to the environment frame

The first behavioural dependent measure, the relative levels of agreement and disagreement to the statement, *This essay made me think more about my own diet*, was assessed using a one-sample t-test.

Within the meal task, three effects were tested. Firstly, the explicit preference, or meal choice selection was compared across sex, before & after conditions, and control & experimental conditions. Two implicit behavioural effects were also assessed: latency (time [in seconds] of first page click on each of the six meal task pages) and click-count (on each of the six pages). Both implicit effects were compared across sex, before & after conditions, and control & experimental conditions.

To assess control versus experimental differences in the explicit meal choice selection, chi-square tests were used for each of the six meal items, and for the combined sample. This process was repeated several times to assess differences between sexes and before & after conditions. For the implicit measures of latency and click-count, Mann-Whitney tests were used to assess control versus experimental differences across each of the six meal items, and for the combined sample. This process was repeated to assess differences between sexes and before & after conditions.
5 Results

5.1 Novelty of the environment frame

To ascertain the degree of novelty (i.e., originality) of the environmental argument framing approach adopted for this study, participants were asked if the essay provided them with new information. There were high levels of agreement to this novelty statement across all four meat-attitude groups. For the experimental condition, 69.9% of participants agreed that the environmental information contained in the essay was new to them (see Figure 5.1). A one-sample t-test between proportions was performed to determine whether there was a significant difference between the percentage who agreed that the information was new versus the percentage who disagreed that the essay was new. This difference was found to be significant \( t = 8.72, p = .001 \).

![Figure 5.1](image_url)

*Figure 5.1. Percentage of agreement across meat-attitude groups that the environmental framing argument used in the essay was novel and original to them.*
5.2 Value of the environment frame

5.2.1 Value of the essay

To gauge attitudinal response to the environment argument framing approach, participants were asked if the essay was valuable to them. There were high levels of agreement to this statement across all four meat-attitude groups, with pro-meat participants expressing a slightly more equal distribution of responses (Figure 5.2). Overall, 79.8% of all participants in the experimental condition agreed that the information contained within the essay was valuable to them. A one-sample t-test between proportions was performed to determine whether there was a significant difference between the percentage who agreed that the information was valuable versus the percentage who disagreed that the essay was valuable. This difference was found to be significant ($t = 14.69, p = .001$).

*Figure 5.2. Percentage of agreement across meat-attitude groups that the environmental framing argument used in the essay was valuable to them.*
5.2.2 Essay valence and composite essay score

The results of the nonparametric Kruskal-Wallis tests indicated significant between-group differences for two of the attitudinal dependent measures: composite essay score \( (p = .0107) \) and valence \( (p < .0001) \). For the composite essay scores, the Mann-Whitney tests performed for each of the six meat-attitude group pairings yielded statistically significant differences between pro-meat & anti-meat \( (p = .0079, r = .38) \), pro-meat & concerned \( (p = .0026, r = .28) \), and pro-meat & disinterested \( (p = .0485, r = .21) \), but not for anti-meat & concerned \( (p = .2651) \), anti-meat & disinterested \( (p = .1522) \), and concerned & disinterested \( (p = .4396) \). Average composite essay scores were hierarchical per meat-attitude group, with anti-meat participants being the most likely to perceive the essay information as valuable \( (7.58) \), followed by concerned \( (6.10) \), disinterested \( (5.30) \), and finally pro-meat \( (3.40) \) participants, from a possible scale of 22 to -22 (see Figure 5.3). All significant differences had effect sizes that exceeded Cohen’s (1988) convention for a small size effect \( (r = .10) \).

Similar results were found in the essay valence measure, whereby significant differences were found between pro-meat & anti-meat \( (p = .0018, r = .45) \), pro-meat & concerned \( (p < .0001, r = .48) \), and pro-meat & disinterested \( (p = .0024, r = .32) \), but not for anti-meat & concerned \( (p = .7734) \), anti-meat & disinterested \( (p = .2684) \), and concerned & disinterested \( (p = .1116) \). Average valence scores were hierarchical per meat-attitude group, with anti-meat participants scoring highest \( (0.67) \), followed by concerned \( (0.62) \), disinterested \( (0.35) \), and pro-meat \( (-0.20) \) participants, from a possible scale of 1 to -1 (see Figure 5.4). All significant differences had effect sizes which exceeded Cohen’s (1998) convention for a medium size effect \( (r = .30) \).

For the overall sample, the Wilcoxon signed rank tests indicated that response to the essay was positive in terms of both the composite essay score \( (\text{median} = 5; p < .0001) \) and essay valence \( (\text{median} = 1; p < .0001) \). Based on these findings, the null hypothesis—that the median for the overall sample would not differ from zero—can be rejected.

A closer look at meat-attitude group-specific Wilcoxon tests for the essay valence measure revealed medians above zero for anti-meat \( (\text{median} = 1; p = .0215) \), concerned \( (\text{median} = 1; p < .0001) \), and disinterested \( (\text{median} = 1; p = .0066) \) groups, but not for the
Figure 5.3. Average scores given by participants across meat-attitude groups for the composite essay measure. Note: a full range of possible values between -22 and 22.

Figure 5.4. Average valence of comments given by participants in response to reading the environmentally-framed essay about animal agriculture. Note: 1 = (entirely positive comments); 0 = (mixed, including both positive and negative comments); -1 (entirely negative comments).
pro-meat (median = 0; p = .21) group. The same tests performed for the composite essay score measure revealed that the medians of all groups (including pro-meat) were significantly above zero; anti-meat (median = 6.5; p = .0005), concerned (median = 5.5, p < .0001, disinterested (median = 5, p < .0001), and pro-meat (median = 2, p = .0011). These data, from both essay valence and composite essay score measures, show that the environment frame is a valuable means of information dissemination in the topic of animal agriculture. Mann-Whitney tests performed to identify differences between males & females, and before & after conditions, were insignificant for both aforementioned dependent measures. In sum, considering the composite essay score and essay valence measures, there was clear evidence that those identifying as anti-meat, concerned, and disinterested responded positively to the essay, and mixed evidence that those identifying as pro-meat responded positively.

As indicated by Figure 5.5, the sentence-specific essay evaluation revealed that the majority of sentences, on average, were rated positively and largely uniformly by all four meat-attitude groups. However, notable peaks occurred across all four meat-attitude groups at the following sentences:

O2: Experts at the Worldwatch Institute agree that the human appetite for meat is the driving force behind virtually every category of environmental damage now threatening our species’ future.

T2: Contemporary methods of raising livestock for human consumption emit more greenhouse gases than the entire global transport sector: the toxic emissions that come from all cars, buses, ships, and planes combined.

T7: A report by the Zoological Society of London claims that 52% of the world’s wildlife has disappeared in the past 40 years, with agriculture among the top causes.

C2: Reducing or eliminating meat consumption has the potential to drastically reduce pollution, climate change, habitat loss, and species extinction.
Conversely, respondents across all four meat-attitude groups reacted less positively to the following sentences:

T6: All of these effects are collectively responsible for the decline in global biodiversity.

B1: According to several studies published in scientific journals, multiple environmental goals can be gained through changes in the human diet.

C1: Environmental wellbeing is dependent on our dietary habits.

C3: For the sake of future generations, reducing meat intake becomes a moral imperative, one that will result in a better natural environment for all of us.

**Figure 5.5.** Average evaluations given to specific sentences within the essay by participants across meat-attitude groups. Sentence abbreviations correspond to O = opening section (4 sentences); T = animal agriculture-related environmental threat section (9 sentences); B = meat reduction benefit section (6 sentences); and C = concluding section (3 sentences). Note: a full range of possible values between -1 and 1.
Figure 5.6. Average participant essay evaluations by essay section. Section abbreviations correspond to O = opening section (4 sentences), T = animal agriculture-related environmental threat section (9 sentences), B = meat reduction benefit section (6 sentences); and C = concluding section (3 sentences).

It is important to note that ‘less positively’ as it is used above does not imply that the sentences were rated negatively. In fact, only two sentences were rated below neutral on average, being sentence T6 (by pro-meat and disinterested groups) and sentence C3 (by the pro-meat group only). Defined by essay section, composite sentence evaluations declined markedly as the essay progressed, with those in the opening and threats sections (paragraphs 1 and 2; see Appendix I) rated higher than those in the benefits and concluding sections (paragraphs 3 and 4; see Appendix I) across all four meat-attitude groups (Figure 5.6).

5.2.3 Differences in meat-attitude identification

Several interesting effects were found in the analysis of meat-attitude group identification. Firstly, there was a significant difference in the meat-attitude classification between males ($mdn = 2, n = 186$) and females ($mdn = 3, n = 222; p = .0002, r = .19$). These
results indicate that concerned and anti-meat groups were picked more commonly amongst females than males.

Secondly, Mann-Whitney tests revealed that participants in the Experimental After condition (having identified their meat-attitude group after reading the essay) showed a significantly higher level of concern than those in both the Control After ($p = .0041, r = .20$) and Experimental Before ($p = .0077, r = .20$) conditions. The median of the Experimental After condition ($3, n = 100$) was higher than both the Control After ($2, n=100$) and the Experimental Before conditions ($2, n = 83$), indicating a higher level of concern. There were no significant differences found between Control Before & Control After ($p = .6281$), and Control Before & Experimental Before ($p = .4692$) conditions, and the medians between both sets were identical. In sum, it appears that those that read the essay before identifying their meat-attitude group (those in the Experimental After condition) were more likely to identify higher levels of concern compared to any of the other conditions (Figure 5.7).

![Figure 5.7. Proportion of participant meat-attitude self-selection across each of the four study conditions.](image-url)
5.3 Behavioural response to the environment frame

5.3.1 Frame-induced behavioural consideration

To assess whether the environment framing argument resulted in behavioural consideration, participants were asked if the essay made them think more about their own diets. There were high levels of agreement to this question across three of four of the meat-attitude groups. Notably, those who identified as pro-meat were equally likely to disagree with the question as they were to agree (Figure 5.8). Overall, 66.1% of all participants in the experimental condition agreed that the information contained within the essay made them consider their own diets. A one-sample t-test between proportions was performed to determine whether there was a significant difference between the percentage who agreed with the statement versus the percentage who disagreed with the statement. This difference was found to be significant ($t = 7.01, p = .001$).

![Figure 5.8. Percentage of agreement across meat-attitude groups that the environmental framing argument used in the essay made them think more about their own diets.](image-url)
5.3.2 Explicit meal choice selection

With regards to the explicit behavioural task measure, several chi-square tests were performed to examine the relationship between meal choice selection (meat versus vegetarian) and males & females; before & after conditions; control & experimental conditions; and meat-attitude classification. The relationship between meal choice selection and before & after conditions was insignificant ($p = .2341$). However, significant differences were found between meal choice selection and sex ($p < .0001$, $V = .19$), with females selecting the vegetarian option significantly more than males (see Figure 5.9).

Significant differences were also found between control & experimental conditions ($p = .003$, $V = .06$), with those in the experimental condition selecting the vegetarian option significantly more than those in the control condition (see Figure 5.10). However, the effect size $V$ was smaller than Cohen’s (1998) convention for a small effect ($r = .10$), suggesting that the $p$ value significance could be due to chance. Further testing is needed in this area.

![Figure 5.9](image_url)  
*Figure 5.9. Proportion of meat versus vegetarian meal choices selected by participants by sex.*
Defined by meat-attitude group (i.e., Experimental pro-meat versus Control pro-meat, Experimental concerned versus Control concerned etc.), chi-square tests found no significant differences in meal choice selection between each of the four experimental and control meat-attitude group pairings. However, significant differences were found in meal choice selection between the meat-attitude group pairings: pro-meat & anti-meat ($p < .0001$, $V = .63$); pro-meat & concerned ($p < .0001$, $V = .32$); pro-meat & disinterested ($p = .0266$, $V = .06$); disinterested & concerned ($p < .0001$, $V = .27$); anti-meat & concerned ($p < .0001$, $V = .32$); anti-meat & disinterested ($p < .0001$, $V = .56$). Meat-attitude meal preference was hierarchical, with anti-meat participants picking the vegetarian option most often, followed by concerned, disinterested, and finally pro-meat participants (see Table 5.1).

### 5.3.3 Implicit meal choice latency & click-count

For the two implicit measures of behavioural response (i.e., latency & click-count), Mann-Whitney tests yielded no significant differences between sex ($p = .3255$ & $p = .3792$), before & after conditions ($p = .5485$ & $p = .1812$), or control & experimental conditions ($p = .5485$ & $p = .1812$).
.4394 & p = .1535). In other words, there were no significant differences in both the meal choice latency and click-count measures between females and males, participants in before and after conditions, and participants in control and experimental conditions.

As with the explicit measure of meal choice selection, further tests were performed for both implicit measures between control & experimental conditions defined by meat-attitude group (i.e., Control pro-meat versus Experimental pro-meat, Control concerned versus Experimental concerned). These tests revealed a significant difference between Control pro-meat latency and Experimental pro-meat latency (p = .0173, r=.23), with experimental pro-meat participants taking less time (in seconds) on average to select their meal choice than control pro-meat participants (Figure 5.11). No further differences were found between each of the four experimental and control meat-attitude group pairings.

As with the explicit measure of meal choice selection, several significant differences were found in latency between the meat-attitude group pairings: pro-meat & disinterested (p = .0243, r=.15); pro-meat & concerned (p = .0005, r=.22); anti-meat & disinterested (p = .0008, r=.27); and anti-meat & concerned (p <.0001, r=.28), but not between pro-meat & anti-meat (p = .0663) and disinterested & concerned (p = .1856). For those pairings that were significant, both pro-meat and anti-meat participants, on average, took less time (in seconds) to select their meal choice than disinterested and concerned participants (Table 5.2).

<table>
<thead>
<tr>
<th>Classification</th>
<th>Meat option selected (%)</th>
<th>Vegetarian option selected (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pro-meat</td>
<td>77.30</td>
<td>22.70</td>
</tr>
<tr>
<td>Disinterested</td>
<td>72.04</td>
<td>27.96</td>
</tr>
<tr>
<td>Concerned</td>
<td>44.81</td>
<td>55.19</td>
</tr>
<tr>
<td>Anti-meat</td>
<td>1.79</td>
<td>98.21</td>
</tr>
</tbody>
</table>
Table 5.2
Median meal choice latency by meat-attitude group.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Median latency (s)</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pro-meat</td>
<td>2.995</td>
<td>105</td>
</tr>
<tr>
<td>Disinterested</td>
<td>3.441</td>
<td>121</td>
</tr>
<tr>
<td>Concerned</td>
<td>3.633</td>
<td>154</td>
</tr>
<tr>
<td>Anti-meat</td>
<td>2.452</td>
<td>28</td>
</tr>
</tbody>
</table>

Figure 5.11. Average time taken (latency) for participants to select their meal choice by meat-attitude group and study condition.
For the second implicit behavioural measure – the average click-count for each meal selection task – there were no significant differences found between the control & experimental conditions defined by meat-attitude group in each of the four pairings. There were also no significant differences found in the click-count between the six meat-attitude group pairings.

In sum, the current study indicates that — considering the explicit measure of meal choice selection – there was significant positive behavioural response to the environmentally-framed animal agriculture essay. However, considering the implicit measures of latency and click-count, there was no significant behavioural response to the environmentally-framed animal agriculture essay, but mixed evidence of differences between meat-attitude groups.

5.4 Qualitative essay response

A subset of the essay valence measure is the qualitative content (and analysis) of the statements made by respondents when they were asked to provide their general reactions to the environmentally-framed animal agriculture essay. Table 5.3 summarises the thematic content of these statements, from which several effects may be observed. Substantial proportions of statements across all four meat-attitude groups critiqued an aspect of the writing, such as the stylistic tone or frame (this was highest among those in identifying as pro-meat). Pro-meat statements also had a relatively high proportion of comments reflecting denial and bias (the latter alongside disinterested statements) whereas a high proportion of anti-meat statements reflected a shared point of view or agreement. Of note is that substantial proportions of the statements across all four meat-attitude groups reflected that the essay was interesting or well-written. The tone and content of qualitative comments will be assessed further in the Discussion (section 6.4).
Table 5.3

*Distribution of themes expressed in reactions to environmentally-framed animal agriculture essay by meat-attitude group.*

<table>
<thead>
<tr>
<th>Theme</th>
<th>% Anti-meat</th>
<th>% Concerned</th>
<th>% Disinterested</th>
<th>% Pro-meat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denial</td>
<td>0.0</td>
<td>1.1</td>
<td>4.1</td>
<td>18.6</td>
</tr>
<tr>
<td>Biased</td>
<td>0.0</td>
<td>7.3</td>
<td>18.4</td>
<td>15.3</td>
</tr>
<tr>
<td>Negative</td>
<td>0.0</td>
<td>4.0</td>
<td>5.1</td>
<td>3.4</td>
</tr>
<tr>
<td>Critique</td>
<td>11.1</td>
<td>16.9</td>
<td>16.3</td>
<td>23.7</td>
</tr>
<tr>
<td>Novel</td>
<td>3.7</td>
<td>11.3</td>
<td>14.3</td>
<td>6.8</td>
</tr>
<tr>
<td>Interesting</td>
<td>37.0</td>
<td>34.5</td>
<td>28.6</td>
<td>15.3</td>
</tr>
<tr>
<td>Reflects POV</td>
<td>44.4</td>
<td>14.1</td>
<td>5.1</td>
<td>1.7</td>
</tr>
<tr>
<td>N/A</td>
<td>3.7</td>
<td>10.7</td>
<td>8.2</td>
<td>15.3</td>
</tr>
</tbody>
</table>
6 Discussion

6.1 Novelty of the environment-framing argument

A considerable majority (69.9%) of all participants found the information contained in the essay to be new to them (see Figure 5.1: Results), and several participants also explicitly commented that they had not encountered this information before (see section 6.4 for further discussion). These findings generally supported the hypothesis (H1) that an argument encouraging dietary change based on the meat industry’s deleterious effects on the environment would be novel (or, at least, not well known). That these issues were previously unknown to most participants reveals the public-awareness gap on this important subject (e.g., de Boer et al., 2013). Arguments against meat consumption have traditionally focussed on animal welfare concerns, and such arguments saturate topical discourse. Through cognitive dissonance (Rothgerber, 2014) and supply-side strategies (Stibbe, 2001), these arguments tend to induce issue fatigue and sometimes even hostility, rendering them largely ineffective (see Dhont & Hodson, 2014).

Furthermore, the tentative handling of the meat-environment link by the media, along with the frequent omission of this issue in contemporary pro-environment discourses, also likely contribute to this lack of public awareness (Kiesel, 2010; Laestadius et al., 2014). As such, an environmentally-framed essay about animal agriculture was relatively new content in the minds of these participants, providing them with a novel argument for consideration. The present findings suggest that, despite the release and dissemination of a few films and books on the subject, such as the documentary Cowspiracy (2014) and the book Comfortably Unaware (2012), the meat-environment link is still not common knowledge. The fact that the essay was largely received positively is akin to findings by Maibach et al. (2010), which highlighted the merits of the novel frame for both attitudinal and behavioural change.

6.2 Value of the environment-framing argument

Like the novelty findings, the clear majority of participants (79.8%) viewed the information in the essay as being valuable (see Figure 5.2: Results), supporting the
hypothesis (H2) that environment-framing is informative and helpful to readers when considering their dietary decisions. When assessed more closely, however, individuals who self-identified as “pro-meat” reacted less positively to the essay than did those in the other three attitudinal categories (i.e., disinterested, concerned, and anti-meat). This is especially notable for the essay valence measure, given that this group’s valence fell below zero (where zero represents a neutral reaction). Overall, people who indicated that they enjoyed eating meat (and had no intention of changing their dietary habits) had a slightly negative reaction to the essay. In addition, there was a natural decrement in valence measures in the expected order; anti-meat reacted most positively to the essay, followed by concerned, disinterested, and finally pro-meat. Anti-meat individuals tended to agree with the information in the essay advocating for reduced meat consumption. By contrast, pro-meat participants neither endorsed nor were willing to consider the need for dietary change. An essay encouraging these individuals to reduce or eliminate their personal meat consumption may go against their values, beliefs, or philosophy, thereby prompting a negative emotional reaction. The fact that the average composite essay score was positive (i.e., revealed a positive or favourable reaction to the essay) in these same pro-meat participants, however, suggests that environment-framing may be welcomed by those who are fundamentally against the call to action being suggested. This recalls the findings of Cordts et al. (2014), regarding the value of information dissemination, of any frame, in positive attitudinal response.

Furthermore, those participants who were asked to classify themselves by their attitude towards meat after reading the essay were more likely to indicate a higher level of concern regarding meat-eating habits, than those who identified before reading the essay (and those who did not see the essay at all). The meat-attitude categorisations used in the present study may be considered a loose representation of stages of change within the transtheoretical model of behaviour (Prochaska et al., 1992), which shows the various stages through which individuals must traverse before deciding to adopt specific behaviours. If so, the anti-meat group may represent the ‘action’ or ‘maintenance’ stage; the pro-meat group reflects the ‘precontemplation’ stage; and concerned and disinterested groups indicate any of the middle stages. Within the transtheoretical model of behaviour, the stage of change (e.g., action, maintenance etc.) is arguably less important than the direction in which an
individual is progressing (i.e., advancing or relapsing). The present results suggest that the dissemination of environment-ally framed information results not only in a progression along the transtheoretical stages towards attitudinal and perhaps eventually behavioural change, but also in reduced indifference, replicating the findings of Bailey et al. (2014).

Several sentences within the essay were rated as being more helpful overall to readers across all four meat-attitude categorisations (see Figure 5.5: Results). It appeared that those rated most helpful contained concrete facts from credible sources (e.g., “A report by the Zoological Society of London claims that 52% of the world’s wildlife has disappeared in the past 40 years, with agriculture among the top causes.”) or contrasted the effects of agriculture with more widely known causes of environmental degradation (e.g., “Contemporary methods of raising livestock for human consumption emit more greenhouse gases than the entire global transport sector: the toxic emissions that come from all cars, buses, ships, and planes combined.”).

Sentence C2 (“Reducing or eliminating meat consumption has the potential to drastically reduce pollution, climate change, habitat loss, and species extinction.”) was also rated to be particularly helpful. This may be since it offers meat reduction as an option, and does not implicate meat as the sole determinant of environmental wellbeing (i.e., sentence C1, which was rated as less helpful overall).

Other sentences rated as less helpful (but not necessarily unhelpful) were those with vague sources and goals (e.g., “According to several studies published in scientific journals, multiple environmental goals can be gained through changes in the human diet.”) and sentences containing no real facts or evidence, but instead acting as transitions between two topics on either side (e.g., “All of these effects are collectively responsible for the decline in global biodiversity.”). Interestingly, this latter sentence (T6) was judged slightly negatively by disinterested and pro-meat participants, suggesting that the link between meat and biodiversity decline may be a sensitive topic (though, the positive rating of sentence T7, which goes into more detail about this link, challenges this interpretation).
Wilson (2006) has presented strong evidence showing the merits and potential of using a moral frame for changing attitudes. However, the effectiveness of its application to this topic is somewhat unclear. The final sentence of the essay ("For the sake of future generations, reducing meat intake becomes a moral imperative, one that will result in a better natural environment for all of us.") was rated less positively among anti-meat, concerned, and disinterested participants, and negatively by pro-meat participants. There was also a mixed reaction to this sentence in the written comments:

I thought the essay was well reasoned for eating less meat and helping the environment. I'm not sure that it is a moral issue as the last sentence suggests. (concerned, female, aged 24)

We need to reduce our meat intake or the world will suffer and it's actually the moral thing to do to protect our environment. (concerned, male, 42)

Additional research is needed to determine the effectiveness of using the moral frame in the meat-environment context. In the current study, the moral issue was stated explicitly only in the single foregoing target sentence (although readers might extrapolate a moralistic theme from the essay as a whole). However, except for sentences T6 and C3 (which were, overall, only slightly below neutral, and only by a minority of participants), the fact that no other sentences were rated negatively or unhelpful is revealing when considering strategic communication approaches to this challenging topic.

The results of the essay task indicate a preference for threat-related (or, loss-framed) information over benefit-related (or, gain-framed) information. As described in section 3.1, the gain-frame (i.e., information framed in terms of positive benefits or motivations) is more effective when applied to issues that are high salience (i.e., high perceived importance [Obermiller, 1995]) and self-other referencing (i.e., reference the benefits or threats to the individual and others [Loroz, 2007]). Conversely, the loss-frame (i.e., information framed in terms of negative threats or losses) is more effective when applied to issues that are low salience (i.e., low perceived importance [Obermiller, 1995]) and self-only referencing (i.e., reference the benefits or threats to the individual only [Loroz, 2007]). The essay used in the
current study included elements of gain-framing and loss-framing. Its focus was on animal agriculture; a topic that may be considered low salience (whereby meat’s impact on the environment is perceived to be low), and was written in a way that was largely self-other referencing, rather than self-only referencing. The observed preference for loss-framed information therefore supports the literature in terms of issue salience (Obermiller, 1995), but also indicates the potential utility of the loss-frame when it comes to self-other referencing information. Conversely, Maibach et al. (2010), whose essay was also both low salience and self-other referencing, found that gain-framed information was rated more favourably than loss-framed information.

Taken together, the current results suggest a need to construct the environment frame such that it contains concrete, factual information and cites evidence from credible sources, a point that was also expressed by participants in several of the written comments (see section 6.4). This has some bearing on the assertions of Cordts et al. (2014) regarding the gravity of trust and credibility in message effectiveness. Multiple solutions to the problem (i.e., not just the “extremist” elimination option), a moral frame, and some combination of gain- and loss-framing may also be beneficial to affecting change, however more research is needed to determine this. Finally, message reception is highly dependent on the recipient’s beliefs, values, and worldview, aspects of their identity that together help to determine their “position” on the transtheoretical model of behaviour. These findings suggest that different strategies should be used to account for these stages in behavioural position (Figure 6.1).

6.3 The environment frame and behavioural change

Most participants (66.1%) agreed that the information contained in the essay made them (re)consider their own meat-consumption habits (see Figure 5.8: Results), which could be a necessary first step in motivating actual behavioural change. This percentage is lower than those assessing whether the essay contained new (69% agree) and valuable (79% agree) information, fulfilling H3: that the environmentally-framed essay about animal agriculture may induce behavioural change, however this will be to a lesser extent than any attitudinal
change. Such findings are expected, given that attitudes are poor predictors of behaviour (Kraus, 1995) and that behaviours require changes by the individual (by contrast, attitudes are the product of social and expected norms). In addition, immediate concerns such as taste and price are more formative in consumer behaviour (e.g., Lea & Worsley, 2003), compared to the relatively effortless changes involved with attitude alteration.

With regards to the meal choice task, which was employed in the current study as a proxy for real-world dietary decisions, those who completed this task after reading the essay were significantly more likely to pick the vegetarian meal options than those who did not read the essay. However, there was a higher proportion selecting meat-based meals over vegetarian-based meals even among the experimental condition. This suggests, again, that

Figure 6.1. Meat-attitude group as a proxy for the transtheoretical stages of change, with communication strategies per stage of change.
the use of meat-environment framing has the potential to influence behaviours, but this will be moderate in comparison to attitudinal change.

The other two behavioural measures produced similarly modest results. Meal choice latency (the amount of time it took for participants to decide on the meal choices presented to them) was included as an implicit measure of real-time cognitive dissonance or moral ambivalence. In general, those who identified as concerned or disinterested took longer to select their preferred meal than did those identifying as pro- and anti-meat. These latency findings suggest that those with an extreme opinion or viewpoint about meat consumption (pro- or anti-) were either unaffected by the framing or even became more fervent in their original views. Not only this, but there were no significant differences found between pro-meat participant latency and anti-meat participant latency, suggesting that both extreme positions experienced this effect to the same degree. These results offer strategic insight into the most effective use of the environmental argument for discouraging people’s meat-consumption, in that targeting individuals who do not already have firmly entrenched views on the subject is more likely to lead to actual dietary change. This affirms points raised by de Bakker and Dagevos (2011), who identified a high proportion of so-called ‘flexitarians’ in their Dutch sample; these authors maintained that people who are neither committed nor uncommitted to meat-eating offer the most potential when it comes to transforming dietary patterns.

Interestingly, pro-meat participants who read the essay took significantly less time to choose their meal than did those who did not read the essay (see Figure 5.11: Results). One possible interpretation of this finding is the “backfire effect” (see section 3.3.4); a reactionary cognitive process in which individuals who hold strong, long-term beliefs and values (in this case, that meat-eating is natural, ‘right,’ and essential) are pushed even further towards this pole upon being presented with logical, scientific counterarguments. Similar findings of such an effect have been reported in studies investigating anti-vaccinators and people against stem cell research. This may explain why pro-meat individuals who read the essay took significantly less time to select their (meat-based) meal choice than did those with the same views, but who did not read the essay.
6.4 Qualitative essay response

The open-ended comments made by participants offered a closer look at their opinions about the essay’s arguments and presentation. What follows is a general inductive analysis (Thomas, 2006) of the prominent themes emerging within these comments.

6.4.1 Comments expressing that the essay was interesting or reflects POV

Many of the respondents made open-ended comments about the essay that demonstrated a positive engagement with the material. For example, around 33 and 49 percent of the comments made by those who self-identified as disinterested and concerned, respectively, stated that the essay reflected their personal point of view, was interesting, informative, well-written, sparked self-reflective consideration about how to take action relative to the environmental problems posed by meat consumption, or some combination of the above. A few examples of this type of written response are as follows:

*I think it would be great for society to start eating less meat, as raising animals for slaughter is cruel anyway. If doing so also helps the environment, then we should all be very interested in trying to do our part in reducing meat consumption.* (concerned, male, aged 32)

*I agree with it. The consumption of meat, particularly pork and beef cattle, has very destructive effects as mentioned in the article, especially when farmed industrially (as opposed to sustainably). I’d love to see the US (where I live) reduce farm subsidies to livestock to encourage more realistic meat pricing, which would naturally drive down the overconsumption of meat. That reduction would mean fewer burgers and steaks in the near term, but a better planet overall for the long term.* (concerned, female, aged 38)

*The essay provides substantial evidence to support its claims. Much of the information it provided I was already aware of but other statements regarding the situation I did not know about. Very powerful essay; it makes the case.* (concerned, male, aged 62)

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3 All comments in the following section have been edited for clarity.
The quality and degree of reader engagement shows clearly that the environmentally-framed essay provided valuable information to participants. As expected, those identifying as anti-meat were most likely to comment that the essay reflected their point of view, which is unsurprising given that most of these participants already abstained from eating meat.

6.4.2 Comments expressing that the essay was novel

Many of the comments also expressed that the information contained in the essay was new to them, a pattern generalising to all four meat-attitude categorisations:

*It is very interesting. I didn’t realize eating meat was bad for the environment. I mean, I get it...cows, pigs, etc die but I didn’t realize the effect of those deaths for the environment.* (pro-meat, female, aged 30)

*This essay raises good points, and this concept is new to me. The author cites many valid reasons why meat consumption could be a threat to natural environments and ecosystems.* (concerned, female, aged 35)

*Very helpful and interesting perspective - I didn’t realize all of these things were true!* (disinterested, male, aged 27)

Comments such as these suggest that the novelty of the environment frame as applied to animal agriculture is one of its most valuable merits. However, such reactions occurred least frequently among comments made by the anti-meat participants. Given that these individuals likely already avoid meat, they may be more aware of the harmful impact of factory farming on the natural environment, especially if they have already transitioned to abstaining from meat as a result of their own research (Fox & Ward, 2008). That concerned and disinterested participants were most likely to see the information in the essay as novel is promising, since most of the general population falls into this broader demographic. Like the results of the meal task (specifically those of the latency measure), these intermediate
groups are more likely to be open-minded on the issue, making them more receptive to the dietary-change message.

The fact that nearly all participants found the essay to be a combination of both novel and interesting confirms the knowledge gap surrounding the deleterious role of agriculture in pro-environment discourse and climate-change debates. Again, this appears to be the result of neglect of the issue by mass media (Almiron & Zoppeddu, 2014) as well as strong, entrenched corporate opposition to raising awareness (Gossard & York, 2003). In fact, several participants directly addressed this knowledge gap in their comments:

I believe that it is true but it has not been picked up by the mainstream media so it has not gotten very much attention. (anti-meat, female, aged 65)

I think it is very relevant and something that should be shared more among the public. (concerned, female, aged 23)

I’m surprised, as this was something I never considered before. Not much information is released or promoted to support these findings. (anti-meat, female, aged 42)

Interestingly, many of the comments within both Interesting and Novel categories expressed a prescriptive tone, with many people stating that the essay made them think about how they may reduce their own consumption:

I was not aware of these statistics before. I knew about deforestation and methane production by cows, but did not realize what an impact it has on the global environment and how serious it is. It makes me rethink eating meat, at least meat like cows/pork, on a regular basis. (concerned, female, aged 37)

I was not aware of some of the issues that were raised in the essay. While I don’t eat a lot of meat, after reading this article, I will look at possibly reducing the meat consumption in my
home. (pro-meat, female, aged 61)

I am definitely a little in shock about the essay since I had no idea that the consumption of meat was actually affected our environment in a negative manner. It kind of makes me rethink about my consumption of meat products. (concerned, female, aged 29)

Such comments provide evidence that the essay fostered a change at least in behavioural intention. This provides support for both the second and third research questions – that the essay contained information that was both new and valuable.

6.4.3 Comments expressing a negative emotional response to the essay

A range of negative emotions, such as fear, anxiety, and worry, were also evoked by the essay, as evidenced by several of the comments:

Worried for my grandchildren. (concerned, male, aged 29)

Makes me nervous reading about how badly this is affecting our earth. (disinterested, female, aged 29)

Anxious about the environment and the fact that I eat meat. (concerned, male, aged 34)

Despite their clearly negative affect, such comments were considered to represent a positive engagement with the material and were coded as such. This is because they imply that the information, claims, and overall message contained within the essay were accepted as valid and truthful. Furthermore, negative emotions are known to trigger avoidance behaviours (see Dienstbier, 1978), a fact that may, in the present case, lead to meat-reduction or elimination. The evocation of negative emotions can sometimes be a useful tool in facilitating behavioural change. That being said, a subset of these negative-emotion comments expressed doubt at the human capacity to achieve the changes being promoted in the essay, exhibiting a similar “consumerist pessimism” found in previous environmentalist studies (Bauman, 2009). Such comments represent a negative reaction, not towards the
information contained in the essay (which, again, appeared to be accepted), but towards their faith in people to take collective action against such an entrenched societal habit:

While extremely compelling, the fact is that the idea of getting people to not eat meat will not be easy, as it has become considered a natural progression of human dominance over the Earth. (disinterested, male, aged 34)

I'm open to the idea of reducing my personal meat consumption; however, I feel as though it's not something that will become a popular choice in society. (disinterested, male, aged 32)

6.4.4 Comments expressing denial, bias, or critique

Pro-meat participants were much more likely to include negative comments under the categorical themes of Denial, Biased, and Critique, which is unsurprising given that many of these participants would be more inclined to seek out faults in, and critically evaluate the essay, which to them contains information that they fundamentally disagree with (see Lord et al., 1979). Such critical evaluation may include questioning the validity or credibility of the statements made, the denial of individual responsibility, the denial of anthropogenic climate change, or critique of the style or tone of the essay itself. Within the Denial category, for example, several comments exhibited a blatant attitude-behaviour gap in response to reading the essay:

That this is very important and informative. it is a well written article. I am not changing my meat habits though. (pro-meat, male, aged 36)

I don’t have any interest or intention of reducing my meat consumption, despite knowing these facts, while this article seems to presume that this is something everyone has to be in agreement over. (pro-meat, male, aged 38)

Interesting essay, but I’m not going to stop eating meat. (pro-meat, male, aged 21)
That we need to eat less meat to help with the environment. I generally agree, but I am also not persuaded to change my eating habits. (pro-meat, male, aged 32)

One participant defended her pro-meat stance through the mechanism of displaced commitment, or the assertion that she helps the environment in other ways (see Stoll-Kleemann et al., 2001):

It didn’t really change my views on eating meat, I don’t really eat that much, and I do other things to help the environment without changing my eating habits. (pro-meat, female, aged 20)

The above statements were coded as Denial statements, as they appeared to accept (to some degree) the information contained in the essay, yet refused to accept personal responsibility or moral imperative to act. Such comments occurred most frequently in pro-meat and disinterested participants, and reflected the attitude-behaviour gap entrenched in everyday society on the issue of dietary choices (Loughnan et al., 2010). Comments of this nature suggest that the information in the essay was not dismissed out of hand, however. In fact, some participants who made statements to this nature noted that they questioned the validity or credibility of the essay as reasoning for their refusal to alter their habits.

Credibility concerns were particularly common across all meat-attitude categorisations, with participants expressing a level of doubt or scepticism of the information being communicated in the essay:

My reaction is really???? I’m having a hard time believing this. Maybe if there was more support or facts to back it up. I think for now I will continue to consume my meat the same as usual. (disinterested, female, aged 36)

I would want to check out their sources because I find it hard to believe that raising livestock emits more greenhouse gases than all transportation methods combined. I can believe the argument that deforestation would be caused by farmers wanting to raise livestock but, and
this is a major 'but', if they cleared the land to plant crops, the resulting loss would be the same or similar. I'm sceptical about the causes and resulting consequences. (disinterested, female, aged 55)

It does not cite specific sources that allow for a person to verify its claims. Though the message may be true, it does not provide enough evidence or specific alternatives that would persuade me to stop eating meat. (pro-meat, female, aged 34)

The essay was well written and presented several interesting facts, but ultimately did not provide enough sources to back up the claims presented. (concerned, female, aged 36)

Such comments expressing credibility concerns may be due to the fact that information about the meat-environment link is so severely underreported (e.g., Almiron & Zoppeddu, 2014), and, in some cases, deliberately hidden (e.g., HHS & USDA, 2015a), making the severity of the industry’s impacts seem almost unbelievable. Elements of the ‘bystander effect’ may also come into play here, in that people may believe that the government would surely intervene if the environmental impacts of meat production, as discussed in the essay, were so severe (see Waller, 2007).

Aside from credibility concerns, some participants completely rejected the information provided in the essay with a conviction that it presented falsehoods. Such comments often implied the reader’s sense of bias or one-sidedness by the author of the essay, whereby the information was perceived to have been communicated with an agenda. In some cases, this agenda was seen as stemming from the ‘radical’ vegetarian or vegan movement (see also Cole & Morgan, 2011):

I feel like this essay was written by vegetarians and they are blaming all of the world’s problems on meat eaters. (disinterested, female, aged 41)

In other instances, the perceived bias was attributed to a manipulative government seeking to misinform its citizens (see also Dunlap & McCright, 2008):
Its hooey, there is not a problem with meat production. The farmers thrive on us meat eaters. This is another joke of the government to scare us into conforming to their “ways”.
(disinterested, female, aged 50)

Although I’m an environmentally oriented person, writing like this really sounds like propaganda for Marxist dictatorship. (disinterested, male, aged 56)

This brand of comment also coincided frequently with a disbelief in anthropogenic climate change, particularly among the concerned group of participants:

First of all, it is full of crap. Global warming otherwise known as climate change does not exist. Humans do not cause climate change. Actually if we had global warming and more CO2 in the atmosphere it would help plants grow much better. The Earth has actually been cooling the past 20 years. Any rise and fall in average temps are because of a natural cycle.
(concerned, male, aged 41)

Propaganda about false human-cause climate change. (pro-meat, female, aged 55)

Comments within both the Biased and Denial categories commonly included terms such as “propaganda”, “radical”, “alarmist”, “extremist” and “blame” (see sections 2.3 and 3.3.4), and several of these responses also lamented the absence of solutions to the climate-related problems being generated by the factory-farming industry, calling the essay extremist for this reason. The essay did, however, offer two possible ways to address the issue: reduce or eliminate meat consumption. Yet several pro-meat or disinterested participants read only the “extreme” solution of eliminating meat from our diets:

The writer pleads for humanity to change our meat-centric diet but offers no alternative solution other than to just give up meat. It feels like a weak argument if they hope to influence change. While I do feel bad about eating meat, I’m not convinced that giving it up cold turkey will be the best solution. (concerned, male, aged 29)
It seems alarmist and doesn’t seek a middle ground. While it stated that the problems are due to current methods of meat production, it doesn’t offer any alternatives other than not to eat meat. (disinterested, female, aged 48)

There were also several comments that deflected the information in the essay and turned to rationalisation arguments outlined in section 2.2.3. These comments included those that referred to our evolutionary dependence on animal protein for the maintenance of a healthy body (i.e., the natural and necessary arguments; see Joy, 2009). These comments may be a product of healthy scepticism rather than explicit rationalisations; however, they nonetheless sidestep the information presented in the essay.

Humans are omnivores, we need meat. (disinterested, male, aged 33)

Seems a bit like an extreme, biased viewpoint. I’m not sold that plant-based diets can be just as nutritional as ones with meat in them. (disinterested, male, aged 38)

I’m sceptical that people could get the nutritional protein and minerals they need from non-meat sources. (pro-meat, female, aged 22)

6.5 Function of the environment frame applied to animal agriculture

I think it makes a compelling argument for a plant-based diet other than the usual moral argument vegetarians and vegans often give. (concerned, female, aged 24)

Overall, the findings from the present study supported the hypotheses that framing the animal-agriculture debate in terms of the industry’s deleterious environmental effects is a novel and valuable way to evoke consideration in those otherwise wary of traditional animal-rights arguments and, possibly, to facilitate dietary change. Contextualising the animal-agriculture debate in terms of its harmful environmental impact offers two unique incentives to anti-meat advocates: it introduces new victims (i.e., species and ecosystems
threatened by industrialised meat production) and a sense of urgency and/or personal relevance among those who are environmentally-minded.

In all pre-existing framing arguments against animal agriculture, the victims have been the livestock: the billions of cows, pigs, sheep, and chickens that are slaughtered for food. Although many people have favourable attitudes towards animals (e.g., Driscoll, 1995), the slaughter of these particular animals has become acceptable in the name of perceived nutritional necessity (Šebek & Temme, 2009 as cited in de Bakker & Dagevos, 2011), related rationalisation arguments (Joy, 2009; Piazza et al., 2015), victim denigration (e.g., Bastian et al., 2012), or complete avoidance of meat-production practices, facilitated by both the supply-side (e.g., Plous, 1993) and the demand-side (e.g., Knight et al., 2003).

In communicating the environmental impacts of meat production and consumption, new victims are introduced which were not previously considered to be involved. These new victims take the form not only of animals (i.e., those threatened by extinction due to the environmental degradation linked to the industry, such as the jaguars and maned wolves mentioned in the essay), but also entire ecosystems (e.g., tropical forests) and, ultimately, humans, who would also suffer from the agriculture-induced effects of climate change and other forms of environmental degradation. Unlike farm animals, these categories of victims are not subjected to value predispositions, pre-existing strategies of de-victimisation, or denigration. In fact, as discussed in section 2.1, many people hold favourable attitudes to both animals (e.g., Driscoll, 1995) and the integrity of the natural environment (Dunlap et al., 1993), not to mention members of our own species (Plous, 1993). The merits of drawing attention to the victimisation of innocent others has been noted by Harré (2011) and other advocates of communicative moralisation (e.g., Rozin et al., 1997).

The environment frame also establishes a link between personal, everyday dietary habits and environmental degradation, which may be particularly influential for individuals concerned with sustainability. The essay made several references to ecosystems (e.g., coral reefs) and environmental problems (e.g., deforestation) that were likely to resonate with readers who identify as being environmentally conscious. These aspects of the vignette
added personal relevance to an issue that may have otherwise lacked this element. For those even vaguely aware of environmental crises, such as climate change, these personally relevant factors should add a sense of urgency to the problems caused by factory farming.

When considering these issues of new victims and the role of environment framing in inducing a sense of personal relevance and urgency in addressing animal-agriculture, the information contained in the essay may have simply bolstered cognitive dissonance strategies among those who consume meat. This would especially seem to be the case for environmentally concerned meat-eaters who were previously unaware of the industry’s effects on the natural environment. Per cognitive dissonance theory (Festinger, 1962), alleviating this moral discomfort requires either bringing values in line with behaviours (in this case, continuing to partake in meat consumption whilst intensifying dissonance alleviation strategies) or bringing behaviours in line with updated values (i.e., reducing or eliminating meat consumption). Combined with any pre-existing dissonance provoked by the traditional ethical argument (i.e., animal suffering or welfare concerns), the essay may have introduced yet more dissonance. For some, this mounting cognitive effort to alleviate personal responsibility may simply be too much, thereby inducing an actual behavioural change in dietary decision-making (and, by extension, progression through the transtheoretical model of behaviour, see Prochaska et al., 1992). The results from the present study indicate that this likely occurred among most participants (right branch, Figure 6.2).

Special consideration, however, must be given to the subset of the population who align as pro-meat in their beliefs, attitudes, and behaviours. The pro-meat participants in the current study experienced an inverse backfire effect (such as that observed by Ho et al., 2008 and Nyhan et al., 2014) with regard to the behavioural measure of meal choice latency. That these participants took less time to select the meat-based meal options after reading the essay suggests that the environment frame prompted additional avoidance or denial mechanisms to enable continued meat consumption (left branch, Figure 6.2). For these participants, increased dissonance, perhaps by the use of some other messaging frame, would be needed to induce change in both attitudes and behaviours.
6.6 Limitations and directions for future research

Although findings from the present study highlight the value of the environment frame as it relates to animal agriculture, it is important to note that there were also several limitations. First, despite the relatively large sample, the participants were unequally distributed across the four groups of meat-attitude categories, with the fewest respondents by far being in the experimental condition and self-identifying as anti-meat (a proportion representing the low frequency of this demographic in the general population: Loughnan et al., 2014). Greater figures within this group would have aided statistical comparisons. Furthermore, the cross-cultural validity of the present results is uncertain. At the moment, they should be interpreted as specific for the ongoing set of affairs in the United States (a nation beleaguered by immense industrial and conservative political opposition to emissions-reduction policies). In addition, the current design did not differentiate between
meat types (e.g., fish, poultry, beef, pork, etc.), or participant demographics such as income or degree of education. Further research should investigate how these variables may affect people’s responses to the environment-framing argument and can serve as useful distinctions for strategic awareness-raising campaigns.

The study design may have been more robust had those participants in the control group been required to undergo a similar essay task to those in the experimental group. The task could have involved reading and responding to an essay of similar style and length, but on an unrelated topic. Not only would this have been more consistent, but it may have also altered the findings in a meaningful way. Future research should endeavour to keep all study conditions as consistent as possible to increase the validity of the results.

In addition, the behavioural dependent measures used in the current design (i.e., meal choice, latency of response, and click-count) attempted to ascertain dietary preference after being exposed to the information in the essay. Although this manipulation did produce certain significant effects (e.g., meal choice selection differences between control & experimental conditions), we cannot be certain as to whether they would translate to actual dietary choice behaviours in the real world, nor whether any such changes would be maintained long term. For the stated benefits in the essay to fully materialise, meat-eating individuals must adopt permanent, or at least long-lasting, dietary change. Therefore, longitudinal behavioural assessment would be an interesting direction for further research to investigate the true potential of the environment frame.

Further research efforts should seek to tease apart different facets of the environment frame to determine which elements have the most persuasive power. Of particular interest is the role of extinction-related concerns. When considering the appeal and most peoples’ favourable attitudes towards charismatic species such as jaguars, wolves, and bears (all currently under threat from the livestock industry), cognitive dissonance defence mechanisms should be highly strained. Investigating the contrast in most people’s attitudes towards domesticated livestock (e.g., cows, chickens) compared to charismatic wild species (e.g., jaguars, bears) when considering the environment frame argument is a rich topic for
further studies. Specifically, it would be interesting to ascertain the extent to which linking wild species extinction reduces meat consumption; this, in turn, could lead to more favourable attitudes towards livestock animals by reminding people of their role in a large-scale, interconnected biosystem.
In traditional discourse, anti-meat activists have relied heavily, if not exclusively, on the animal welfare argument to discourage people from consuming meat. Although concerns over animal suffering are central to the debate, this tactic alone is vulnerable to cognitive dissonance (e.g., denial of animal mind) and it has also arguably been “overused” to the point of issue fatigue, whereby people simply no longer engage in the conversation. Results from the present study, by contrast, reveal that framing the argument against meat in the context of environmental concerns is judged as both new and valuable by most readers.

Moreover, this framing led over half of the sample of meat-eating participants to state that they intended to reduce their personal meat consumption in the future. As the global community continues to spiral towards unsustainability, the rising rates of meat consumption will only become more pressing in the light of worsening climate change and its consequent negative effects on the environment. To induce behavioural dietary change in consumers, this research suggests that future communication efforts in this area should be approached in several strategic ways.

First, communication about this issue should seek to identify and fill knowledge gaps. Closing knowledge gaps appear to be an important and effective precondition for inspiring people to make a voluntary change in their dietary decisions. In the case of livestock production, concentrated efforts to inform the public about the effects of animal agriculture on the natural environment could lead to increased public pressure for appropriate governmental response to the problem, decreased societal resistance from government interventions, and/or increased support for plant-based alternatives (Bailey et al., 2014).

Issues should be reframed to present a familiar topic in unfamiliar ways. As Maibach et al. (2010) have demonstrated, providing a new frame of reference on a familiar or fatigued issue may be effective at drawing the audience’s attention back to a problem.
The current study supports this line of reasoning by demonstrating how a novel frame (in this case, environment-framing) may be particularly helpful if it introduces a sense of urgency, personal relevance, or new victims. The latter appeals to the emotional brain by evoking empathy. This in turn, should facilitate meat-avoidance behaviours.

The level of risk involved in adopting the proposed behaviour change being communicated, is a determining factor in decision-making. Therefore, sustainable communication should **consider the interplay of gain- and loss-framing**. The effectiveness and persuasiveness of respective gain- and loss-framing depends on several elements, such as the degree of self or self-other referencing, as well as issue salience. Overall, the current study demonstrates how, in the case of meat-eating, loss-framing (i.e., information about the environmental threats of not reducing meat consumption) seems to be more persuasive than gain-framing (i.e., information about the benefits of reducing meat consumption) when it comes to people stating their intention to change their dietary habits.

Communication efforts should **contain concrete evidence from credible sources**. Several comments made by the participants relayed the importance of credibility cues; sentences that presented concrete facts about the harmful effects of factory farming on the environment that came from cited authorities were rated to be more helpful. Today’s information age is rife with misinformation, and trust in the message is of paramount importance to how it is received (Cordts et al., 2014). Therefore, the provision of clear, authority-sourced information is likely to aid message receptivity.

The inclusion of **prescriptive information** would be worthwhile to the overall message. Several participants in the present research expressed an appreciation for prescriptive information (i.e., what to do about the problem), such as a realistic amount of meat that they could cut from their diet to make a positive difference. Whilst participants in the present study were referred to websites for such prescriptive suggestions, these responses indicate that including clear advice in the framing itself may be instrumental for encouraging actual behavioural change.
In the case of meat-eating, future communications should avoid an exclusive focus on climate change. Of the several environmental impacts included in the essay, the issue of climate change appeared to be the most contentious, often prompting disbelief or denial – a trend reflecting partisan split in popular debates (Dunlap & McCright, 2008). That is not to say that the connection between meat and climate change should be neglected completely. For broader engagement and appeal, it may be preferable to explore additional facets of environmental impacts, such as those of freshwater pollution, tropical deforestation, and species extinction.

Complete elimination of meat is an unpopular notion for many (but particularly those who consider themselves to be pro-meat). To counter the audience’s aversion to a “radical” change in their dietary habits, it may be more effective to stress the role of meat-reduction over complete elimination. Although the current study included aspects of both, many individuals seemed to perceive only a complete meat-elimination message, and unfavourably so. To avoid antagonising readers, therefore, the meat-reduction message should be highlighted.

Finally, response to the environment frame is not uniform across individuals, and depends on their existing values, sex, and stage of behavioural change. Whilst the former is difficult to target, environmental communication should employ a targeted approach, by using various frames to accommodate individual differences. Males are less likely to be receptive to the meat-reduction message than are females, and pro-meat participants (or, those at the pre-contemplation stage within the transtheoretical model of behaviour) are also less open to change. Furthermore, differences may exist in other key demographics, such as education, income level, or religiosity. For these groups, therefore, a targeted approach should be applied to capitalise on these differences, thereby appealing to different values and beliefs. A focus on the intermediate groups between the two extreme viewpoints (i.e., concerned or disinterested individuals as defined in the current study) may also yield promising results, as they are likely to be more open to attitude alteration.
This study has added to knowledge regarding public attitudes to meat consumption as a contentious environmental issue. It suggests that the environment frame, as applied in communication of this issue, results in positive engagement for most consumers. Although further research is needed to determine its true value, and while these results cannot be generalised to entire populations, the present study has nonetheless provided valuable insight into how future communications to address this increasingly urgent issue may be shaped to maximise receptivity and resultant change.
References


Appendices

Appendix I: Essay & Survey

Assessing Food Preference
Information Sheet for Participants
University of Otago Human Ethics Committee Reference Number: D16 149 [1 June 2016]

Thank you for your interest in this project. Please read this information sheet carefully before deciding whether or not to participate. If you decide to participate, we thank you. If you decide not to take part, there will be no disadvantage to you and we thank you for considering our request.

What Is the Aim of the Project?
This study aims to assess people’s attitudes and preferences towards food and diet.

What Types of Participants are being sought?
We require English-speaking participants from varying backgrounds. You are not eligible to participate if you are less than 18 years old. You will be asked to provide basic demographic data (age & sex). All personal information collected for the study will remain completely anonymous. Reimbursement of 0.50 USD is offered on completion via the Mechanical Turk payment system.

What will you be asked to do?
Should you agree to take part in this project, you will be asked to:
* Read and agree to a consent form
* Provide your age, sex, and some basic information about your diet.
* Complete a short survey about your food preferences.

Participation should take no longer than 10 minutes. You may decide not to take part in the project without any disadvantage to yourself of any kind.

What Data or Information will be collected and what use will be made of it?
The raw data that will be collected includes:
* Your age and sex.
* Your attitude towards food and diet.
* Your survey responses.

Should you choose to withdraw from the study at any point, you may simply close the window and your responses will be instantly deleted. Please note that you will be ineligible to receive reimbursement if you do so.
Once you press the “Submit” button at the end of the study, your results will be recorded and cannot be altered or retrieved after this point. Data will be held for a minimum of five years as per University of Otago regulations and possibly indefinitely beyond that period. Data collected for this study will not be used for commercial purposes. The results of the study will be published and participants will be able to access any resulting journal articles through the University of Otago (New Zealand) Library.

**Can Participants change their mind and withdraw from the project?**
Again, you may withdraw from participation in the project at any time without any disadvantage to yourself of any kind. Should you choose to withdraw, simply close the survey window at any point. Your responses will be instantly deleted. However you will be ineligible to receive reimbursement.

**What if Participants have any questions?**
If you have any questions about our project, either now or in the future, please feel free to contact:

Associate Professor Jesse Bering  
Centre for Science Communication  
University of Otago  
New Zealand  
Telephone: +64 3 471 6147  
Email: jesse.bering@otago.ac.nz

This study has been approved by the University of Otago Human Ethics Committee. If you have any concerns about the ethical conduct of the research you may contact the Committee through the Human Ethics Committee Administrator (ph +643 479 8256 or email gary.witte@otago.ac.nz). Any issues you raise will be treated in confidence and investigated and you will be informed of the outcome.

 [*Click here to indicate that you have read and understood this information sheet.*]

**Consent Form**

Please read the following consent form:

I have read the Information Sheet concerning this project and understand what it is about. All my questions have been answered to my satisfaction. I understand that I am free to request further information at any stage.
I know that:
1. My participation in the project is entirely voluntary;

2. I will receive a small reimbursement as thanks for participating in this study upon completion;

3. I am free to withdraw from the project at any time, however I will be ineligible to receive reimbursement if I do so;

4. My personal identifying information will be destroyed at the conclusion of the project but any raw data on which the results of the project depend will be retained in secure storage for at least five years;

5. The results of the project may be published and, if so, will be available in the University of Otago Library (Dunedin, New Zealand). My responses will remain anonymous.

☐ Click here to indicate that you have read and understood this consent form and agree to take part in this study.

Demographics

What is your sex?
☐ Female
☐ Male

What is your date of birth? MM/DD/YYYY

Please pick the option which best describes your dietary views:
☐ I eat meat and I have no problem with doing so. I have zero interest in reducing my meat consumption.
☐ I eat meat and I don't really think about it. I have little interest in reducing my meat consumption.
☐ I eat meat but I am concerned about some aspect of it. I am interested in reducing my meat consumption.
☐ I refrain from consuming meat. I believe that humans should not eat meat.
Although not widely known, animal agriculture poses a very real threat to our natural environments, processes, and ecosystems. Experts at the Worldwatch Institute agree that the human appetite for meat is the driving force behind virtually every category of environmental damage now threatening our species’ future. If we do not take steps to address our meat consumption, environmental degradation will escalate to dangerous, even catastrophic, levels. Conversely, if we do take steps to address our meat consumption, this potential disaster may still be averted and environmental conditions improved in a number of important ways.

**Our environment will suffer if we don’t take action**
The production of meat puts enormous strain on the natural environment. Contemporary methods of raising livestock for human consumption emit more greenhouse gases than the entire global transport sector: the toxic emissions that come from all cars, buses, ships, and planes combined. The livestock sector also plays the largest role in habitat loss and deforestation, especially when it comes to the destruction of tropical forests. Up to ten times the amount of land is needed to produce livestock compared to plant-based crops, making meat an inefficient source of food. Furthermore, the huge amounts of waste linked to livestock (with pollutants such as pesticides, fertilisers, and veterinary drugs) leach into waterways, resulting in over 500 ocean “dead zones” at river mouths worldwide. All of these effects are collectively responsible for the decline in global biodiversity. A report by the Zoological Society of London claims that 52% of the world’s wildlife has disappeared in the past 40 years, with agriculture among the top causes. Puma, jaguar, maned wolves, and a large number of other species have become regionally extinct in areas of the Amazon due to habitat loss primarily driven by livestock production. The upward trend in meat consumption will result in ever more forest clearance, greenhouse gas emissions, water pollution, and species extinction on a global scale.

**Our environment will benefit if we do take action**
According to several studies published in scientific journals, multiple environmental goals can be gained through changes in the human diet. The global transition towards low-meat diets can drastically reduce the effects of climate change, without compromising nutritional value, by lowering the levels of harmful greenhouse gas emissions. Several experts agree that meeting the 2°C climate objective – an international agreement to limit global temperature rise to 2 degrees Celsius above pre-industrial levels - will be impossible to achieve without a global shift in diet. Such
a shift will also lower rates of pollution, deforestation, and habitat loss, because much less land will be required to produce plant-based foods compared to animal-based foods. Finally, eating less meat will drastically reduce the extinction of both wild ecosystems (such as coral reefs) by lessening the effects of climate change and water pollution, and species (such as jaguars and bears) by reducing habitat loss and the killing of wild predators that threaten livestock. In short, healthier ecosystems result in a healthier planet, which directly translates to human beings living healthier lives.

Environmental wellbeing is dependent on our dietary habits. Reducing or eliminating meat consumption has the potential to drastically reduce pollution, climate change, habitat loss, and species extinction. For the sake of future generations, reducing meat intake becomes a moral imperative, one that will result in a better natural environment for all of us.

What is your general reaction to the essay?

Supplementary Questions

This essay...

Has provided new information

○ Strongly Disagree ○ Disagree ○ Neutral ○ Agree ○ Strongly Agree

Has provided valuable information

○ Strongly Disagree ○ Disagree ○ Neutral ○ Agree ○ Strongly Agree

Has made me think more about my own diet

○ Strongly Disagree ○ Disagree ○ Neutral ○ Agree ○ Strongly Agree
Meal Tasks

On the following pages, you will be presented with a series of food items. Please pick the one on each page you find most appealing. Photo examples are given, but try to consider what each option represents rather than focussing on specific items in the photos.

1. Given the choice, which of the below menu items would you choose?

- Full English Breakfast
- Vegetarian English Breakfast

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- Page Submit: 0 seconds
- Click Count: 0 clicks

2. Given the choice, which of the below menu items would you choose?

- Meat pizza
- Veggie pizza
3. Given the choice, which of the below menu items would you choose?

Veggie lasagna

Meat lasagna

4. Given the choice, which of the below menu items would you choose?

Cauliflower Buffalo Bites

Buffalo Chicken Bites
5. Given the choice, which of the below menu items would you choose?

- Grilled Veggie Sandwich
- Grilled Chicken Sandwich

6. Given the choice, which of the below menu items would you choose?

- Meat baked potato
- Veggie baked potato
Debriefing – Control group

Thank you! Please read the following debrief:

The study you have just completed was meant to assess attitudes towards food, and how these relate to food preferences amongst members of the general public, such as yourself.

Debriefing - Experimental group

Thank you! Please read the following debrief:

The study you have just completed was meant to investigate how members of the general public, such as yourself, respond to an essay about the environmental impacts of animal agriculture. The essay you have read is scientifically accurate, and more information (with sources) can be found here: http://bit.ly/1vOVfW8
Appendix II: Ethics Approval Form

13 June 2016

Assoc. Prof. J Bering
Centre for Science Communication
133 Union St East

Dear Assoc. Prof. Bering,

I am writing to confirm for you the status of your proposal entitled “Rainforest, reef and our appetite for beef: Framing animal agriculture through conservation”, which was originally received on May 17, 2016. The Human Ethics Committee’s reference number for this proposal is D16/149.

The above application was Category B and had therefore been considered within the Department or School. The outcome was subsequently reviewed by the University of Otago Human Ethics Committee. The outcome of that consideration was that the proposal was approved.

Approval is for up to three years from the date of HOD approval. If this project has not been completed within three years of this date, re-approval must be requested. If the nature, consent, location, procedures or personnel of your approved application change, please advise me in writing.

Yours sincerely,

Mr Gary Witte
Manager, Academic Committees
Tel: 479 8250
Email: gary.witte@otago.ac.nz