Rationalizing meat consumption

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Rationalizing Meat Consumption: The 4Ns

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Abstract

Recent theorizing suggests the 4Ns—that is, the belief that eating meat is *natural*, *normal*, *necessary*, and *nice*—are common rationalizations people use to defend their choice of eating meat. However, such theorizing has yet to be subjected to empirical testing. Six studies were conducted on the 4Ns. Studies 1a-1b demonstrated that the 4N classification captures the vast majority (83%-91%) of justifications people naturally offer in defense of eating meat. In Study 2, individuals who endorsed the 4Ns tended also to objectify (dementalize) animals and included fewer animals in their circle of moral concern, and this was true independent of social dominance orientation. Subsequent studies (Studies 3-5) showed that individuals who endorsed the 4Ns tend not to be motivated by ethical concerns when making food choices, are less involved in animal-welfare advocacy, less driven to restrict animal products from their diet, less proud of their animal-product decisions, tend to endorse Speciesist attitudes, tend to consume meat and animal products more frequently, and are highly committed to eating meat. Furthermore, omnivores who strongly endorsed the 4Ns tended to experience less guilt about their animal-product decisions, highlighting the guilt-alleviating function of the 4Ns.

Keywords: meat, vegetarianism, rationalization, justification, animal welfare, attitudes

Rationalizing Meat Consumption: The 4Ns

Introduction

Many omnivores are confronted by a "meat paradox" (Herzog, 2010; Joy, 2010; Loughnan, Bastian, & Haslam, 2014; Loughnan, Haslam, & Bastian, 2010). They are morally conflicted by the thought of their behavior harming animals, while also enjoying meat as a desirable staple in their diet. Loughnan et al. (2014) argue, consistent with cognitive dissonance theory (Cooper, 2007; Festinger, 1957; Harmon-Jones & Mills, 1999), that resolution of this conflict can take one of two routes: one can reject meat consumption, bringing one's behaviors into alignment with one's moral ideals, or one can bring one's beliefs and attitudes in line with one's behavior through various psychological maneuvers (see below). The fact that omnivores continue to make up the vast majority of the world's population (see Ruby, 2012) suggests that the latter route is most commonly adopted.

Research attests that there are numerous strategies available to omnivores to bring their beliefs and behavior in line, including denying that animals used as food suffer (Bastian, Loughnan, Haslam, & Radke, 2012; Bratanova, Loughnan, & Bastian, 2011), or that such animals are worthy of moral concern (Loughnan et al., 2010). One common, yet under-studied mechanism omnivores employ when resolving the meat paradox is *rationalization*. Rationalization involves providing reasonable justifications for one's behavior when it comes under scrutiny or criticism, or when one's behavior is perceived as discrepant with an integral aspect of one's character (Kunda, 1990; Mercier, 2011; Tsang, 2002). Rationalizing potentially morally troublesome behaviors has both social and personal benefits. Humans live in tight-knit social groups in which it is important to manage and defend one's actions to others (Ingram, Piazza, & Bering, 2009). Providing defensible reasons and arguments

for one's actions when one's actions are called into question is therefore an essential part of human sociality (Haidt, 2001; Mercier & Sperber, 2011). Rationalization is also essential to maintaining a positive image of oneself as a good, moral person (Bandura, 1999; Jordan & Monin, 2008; Mazar, Amir, & Ariely, 2008). Research suggests that people often rationalize their behavior when they are motivated to continue in a practice or belief that they might otherwise feel guilty about on account of dissenting perspectives (Kundra, 1990; Haidt, 2001; Uhlmann, Pizarro, Tannenbaum, & Ditto, 2009). While the ultimate goal of rationalization is to persuade others of the legitimacy of one's perspective, rationalization functions best if the actor is convinced by his or her own justifications (Tsang, 2002). One consequence of this motivated reasoning process is that people will often seek out arguments that support their own viewpoint, while overlooking or dismissing arguments that challenge it (Ditto & Lopez, 1992; Kuhn, 1991; Nickerson, 1998). This leads people to overestimate the amount of evidence that favors their position, known as "myside bias" or belief overkill (see Baron, 1995; Perkins, 1985; Stanovich, West & Toplak, 2013).[1]

Meat eating is a practice that in recent years has become subject to criticism. Recent polls indicate that about 3-5% of adults in the U.S., and roughly 8% in Canada and 3-8% in the United Kingdom, self-identify as practicing vegetarians, though a number of polled vegetarians admit to sometimes eating meat, particularly fish or

[1] In one unpublished study (Piazza, 2013) a group of Americans were asked to rate the extent to which animals were suffering as a result of current factory-farming practices in the U.S. Individuals who believed animals do not suffer much tended to also believe that raising livestock for meat does not have destructive consequences for the environment, that being a vegetarian does not help reduce world hunger, that eating meat has major health benefits and few risks, that practicing vegetarianism does not promote human-directed compassion, and that meat-based meals are more affordable than vegetarian-based meals. In short, people's beliefs about vegetarianism came packaged in such a way that the bulk of evidence was stacked highly in favor of their preferred view, consistent with a belief-overkill or myside bias.

poultry (Gallup, 2012; GfK Social Research, 2009; National Institute of Nutrition, 1997, 2001; Vegetarian Resource Group, 2012). Vegetarians often endorse a multitude of reasons for rejecting meat or restricting meat from their diet, including health, environment, and taste (see e.g., Berndsen & van der Pligt, 2004; Rozin, Markwith, & Stoess, 1997), yet an increasingly common motivation involves moral concerns about the cruel treatment of animals raised and slaughtered for food (Amato & Partridge, 1989; Beardsworth & Keil, 1991; Fessler, Arguello, Mekdara, & Macias, 2003; Fox & Ward, 2008; Herzog, 2010; Jabs, Devine, & Sobal, 1998; Lindeman & Väänänen, 2000; Ruby, 2012; Santos & Booth, 1996). Although meat eating is still the norm in most countries, many people—including meat eaters themselves—believe that vegetarianism is a morally admirable practice for which vegetarians deserve credit (Minson & Monin, 2012; Ruby & Heine, 2011). For example, Ruby and Heine (2011) found that, all else equal, individuals who reject meat are rated as more virtuous than individuals who eat meat. This was true both among vegetarian and omnivore participants, and when controlling for perceptions of the healthiness of the vegetarian target's diet.

One consequence of this moral accreditation is that meat eaters sometimes respond defensively to the presence of vegetarians. This may be because vegetarian appeals and campaigns sometimes come across as self-righteous, and thus off-putting. Additionally, it may be that the moral commitments of vegetarians pose an implicit threat to meat eaters' own moral identities. If some individuals refrain from eating animals out of concern for animal welfare, this raises the question of whether others should do likewise, in effect, "If *we* can do it, why don't *you*?" (see Minson & Monin, 2012). Thus, omnivores today sometimes find themselves in social situations where they must defend their commitments to eating meat.

The 3Ns of Justification

According to Joy (2010), there are principally three categories of justifications that meat eaters have at their disposal to preserve their commitment to eating meat and diffuse any guilt they might otherwise experience as a consequence of consuming animal products. These justifications include that eating meat is *natural, normal,* and *necessary,* otherwise known as the "Three Ns of Justification" (see Joy, 2010, pp. 96-97). Joy argues that through a recurrent process of socialization people come to believe that eating meat is *natural*—that eating meat is written in our biology, meat is what we naturally crave, and it is what our species evolved to eat; that eating meat is *normal*—that it is what most people in civilized society do and what most people expect from us; and that eating meat is *necessary*—that we need meat for survival or that we need to consume at least some meat to be strong, fully healthy individuals. Joy proposes that the 3Ns are widespread beliefs that are reinforced through various social channels, including family, media, religion, and various private and public organizations. For example, one popular belief related to the *necessity* of eating meat is the idea that one cannot maintain a diet that contains enough protein without consuming at least some meat. Although scientists, including the American Dietetic Association (ADA), America's leading organization of nutritionists, have released numerous publications showing that this is not the case (see e.g., ADA, 2009; Rand, Pellett, & Young, 2003; Young & Pellett, 1994), the belief is persistent.

The application of the 3Ns is not limited to meat eating. The 3Ns may be a ubiquitous set of rationalizations that have an even broader application. Many historical practices, from slavery to sexism, have invoked the 3Ns as justification. For example, in defense of male-only voting practices in the U.S. opponents of women's suffrage often appealed to the *necessity* of denying women the vote to prevent

144 "irreparable damage" to the nation, to the *natural* superiority of male intelligence, and
145 to the historical *normalness* of male-only voting as "designed by our forefathers"
146 (Joy, 2010, p. 97; see footnote for a contemporary example).[2] Today, most people
147 find such arguments in support of male-only voting ludicrous at best. However, it is
148 often only after a system collapses that people come to scrutinize or question the
149 justifications supporting it. By contrast, when an ideology is widely endorsed, as meat
150 eating is in most parts of the world today, the justifications supporting the ideology
151 generally go unchallenged. Unless directly challenged by an alternative viewpoint,
152 people tend not to question the legitimacy of their rationalizations (see Haidt, 2001).

153 **A fourth "N" and present research**

154 Although there have been some qualitative studies of the 3Ns, mainly by Joy
155 (2010), there is currently almost no systematic, quantitative research in support of the
156 3Ns as prevalent meat-eating justifications. Nor has there been any work investigating
157 the relationship between 3N endorsement and people's eating practices, meat and
158 animal-product consumption, or attitudes towards animal welfare. Thus, the present
159 research was intended to fill this empirical gap.

160 Before we outline our research plan and hypotheses, there is one final matter
161 to address. There may be a fourth N specific to meat eating, not captured under the
162 3N justification scheme. Several lines of evidence suggest that the enjoyment people
163 derive from eating meat is a major barrier to reducing meat consumption and/or
164 adopting a vegetarian diet (e.g., Kenyon & Barker, 1998; Lea & Worsely, 2001, 2003;
165 Ruby, 2012). For example, Lea and Worsely (2001) found "meat appreciation and

[2] 3N justifications are currently being applied within various ongoing, ideological debates. As one example, opponents of same-sex marriage often appeal to the *necessity* of limiting marriage to heterosexual couples to prevent "further weakening of the institution...giving people in polygamous, incestuous, bestial, and other nontraditional relationships the right to marry", to the *naturalness* of marriage as "a union of man and woman, uniquely involving the procreation and rearing of children within a family", and to the *normalness* of heterosexual marriage as an institution "as old as the book of Genesis" (Gay Marriage ProCon.org, 2014).

enjoyment" to be one of the biggest obstacles for Australian women contemplating a vegetarian diet. Likewise, Rothgerber (2013) found that pro-meat attitudes, which tend to be higher among men, are a strong predictor of continued meat consumption. Furthermore, as we discuss below (see Studies 1a-1b), when meat-eaters are asked to defend their right to eat meat, they often appeal to the tastiness of meat, or the hedonic pleasure that they derive from it, as a justification for its continued consumption.

For these reasons, we submit *niceness* as a fourth N (justification) used in defense of eating meat, closing out the 4Ns at *natural, normal, necessary,* and *nice.* We speculate that *nice* has largely been ignored by theorists as a potential justification category because it constitutes a very weak moral defense. This becomes apparent when it's applied to less controversial ideologies, such as sexism. Imagine someone making the argument that men should continue to be granted favor in society simply because men derive pleasure from their elevated position. Few people would find such an argument defensible, as it prioritizes the relatively trivial pleasure of some (men) over the much deeper suffering of others (women). Yet this argument is analogous to the one employed in defense of eating meat on account of the pleasure humans derive from it.[3]

In the present research, we tested whether the 4Ns are in fact the principal justifications omnivores offer in defense of their commitment to eating meat. In Studies 1a and 1b, we tested this very simply by having omnivores provide three reasons why they think it is acceptable to eat meat, and we coded their responses via independent raters. In Studies 2-5, our main aim was to develop an instrument for

[3] Of course, one can argue that sexism and animal welfare are not completely analogous insofar as sexism negatively affects *people* and meat eating negatively affects *animals*. But unless a person does not care at all about the suffering of animals used as food, the argument remains analogous by degree.

reliably assessing 4N endorsement along a continuum, which could be used to assess the strength of an individual's commitment to defending the legitimacy of their meat consumption. Finally, in these latter studies, we sought to test a number of predictions about the role of 4N endorsement in relation to people's dietary practices, meat consumption, and the moral attitudes they hold towards animals.

Study 1a and 1b – Spontaneous Justifications for Eating Meat

The aim of these studies was to test whether the 4Ns would emerge as the lion's share of spontaneous justifications omnivores offer in defense of eating meat. The method was simple: we asked two different groups of individuals (university students in Study 1a; Mechanical Turk workers in Study 1b) to provide three reasons why it is "OK" to eat meat, and independent raters coded their responses.

Study 1a

Participants, materials, and procedures. We recruited 188 students from the University of Pennsylvania to participate in exchange for course credit. The study was embedded in a larger package of studies with non-overlapping themes. In response to a filter question, "Do you ever eat meat, for example, beef, pork/ham, chicken, turkey, fish or other kinds of seafood?" twelve participants (6%) reported that they never eat meat. The remaining 176 meat-eating participants (114 women, 62 men; M_{age} = 19.66, SD = 2.07) continued with the meat-eating justification question, while the twelve non-meat-eaters skipped this question. Participants were instructed: "Please give three reasons why you think it is OK to eat meat," and were provided three separate textboxes to type in their three reasons. Among the sample of 176 meat eaters, 91% reported being "omnivores", 6% "semi-vegetarians", and 3% "pescetarians" (fish or seafood was the only meat they ate); 81% were American, 19% had other

nationalities. The sample was ethnically diverse, religiously diverse, and, on average, politically moderate.[4]

Coding of justifications. Two participants offered only two justifications, while all others offered three, producing a grand total of 526 responses. Three of the authors [JP, MBR, SL] each read the entirety of responses given and together they devised a coding scheme to fully capture the range of responses offered (see Table 1 for coding scheme and examples for each category). Next, two of the authors [JP, MBR] separately coded a different half of the responses using the coding scheme, and a third person, an English-speaking undergraduate student, blind to the objectives of the study, independently coded all of the responses. Interrater agreement was high between both sets of coders. There were 236 agreements out of 264 between the independent coder and JP (89.4% agreement rate). There were 250 agreements out of 262 between the independent coder and MR (95.4% agreement). Disagreements between the raters were resolved via joint discussion sessions. Twelve responses were determined to be unscorable, leaving a final total of 514 scored responses.

[Insert Table 1 about here]

Results

Figure 1 presents the frequency of each response category. The 4Ns accounted for 83% of the total justifications offered. Necessary was the largest category, followed by Nice, Natural, and Normal, respectively. There were a fairly large

[4] Study 1a ethnicity: 51% White/Caucasian, 24% East Asian, 9% Hispanic, 7% Black/African American, 9% other or multiple ethnicities. Religion: 23% Jewish, 21% Catholic, 10% Protestant, 4% Other Christian denomination, 3% Evangelical Christian, 3% Muslim, 3% Buddhist, 2% Hindu, 3% Personal spirituality, 9% had no religion/faith, 9% Agnostic, 10% Atheist. Measured on 1-7 scales, the sample was on average politically moderate (M = 3.27, SD = 1.31, 1 = "Very liberal", 7 = "Very conservative"), somewhat religious (M = 2.78, SD = 1.60, 1, = "Not at all religious", 7 = "Very religious"), and moderately spiritual (M = 3.53, SD = 1.75, 1 = "Not at all spiritual", 7 = "Very spiritual").

percent of miscellaneous justifications in this sample, but the percent of miscellaneous justifications never exceeded the percent obtained for each of the 4Ns.

[Insert Figure 1 about here]

In sum, the 4Ns made up the bulk of justifications spontaneously offered by omnivores in defense of eating meat. In Study 1b, we sought to replicate this finding using a different, non-student sample.

Study 1b

We recruited 107 adults (49 women, 57 men; M_{age} = 34.90, SD = 12.15) using Amazon's Mechanical Turk (www.mturk.com). All participants were located in the U.S. and paid for their participation. Although we did not assess participants' diet in this study, rates of non-omnivores (strict vegetarians and vegans) among MTurk workers tend to reflect levels on par with the overall population (1-5%; see Studies 3-5). The phrasing of the meat justification probe was the same as in Study 1a (i.e., "Please give three reasons why you think it is OK to eat meat"). A total of 321 responses were collected. Two independent raters (undergraduate students; one blind to the hypotheses) coded the responses and agreed in their classification 95.7% of the time. Disagreements were resolved between the two raters through discussion.

As can be seen in Figure 2, the category frequencies were quite consistent with the results from Study 1a. The 4Ns accounted for 91% of the total justifications offered. As in Study 1a, Necessary was the most frequent justification category. Necessary was followed by Natural, Nice, and Normal, respectively. Thus, the results largely replicated Study 1a, yet with an even larger representation of the 4Ns offered as justifications for eating meat.

[Insert Figure 2 about here]

Studies 1a and 1b demonstrated the prevalent use of the 4Ns as justifications for eating meat. In the following studies, we turn to the objectives of developing a reliable instrument (the 4N scale) for assessing 4N endorsement as a continuous measure, and testing the relationship between 4N endorsement and various dietary and animal-welfare practices and motivations.

Study 2 – The 4Ns and Moral Concern for Animals

Study 2 had four objectives. First, we developed a scale for assessing 4N endorsement as a continuous variable. Second, we sought to show that individuals with dietary restrictions regarding meat would endorse the 4Ns to a lesser extent than individuals without these restrictions. Third, we tested whether our newly developed 4N scale would predict various morally relevant attitudes towards animals, including the diversity of animals one cares about and the degree to which individuals attribute mental capacities to animals. Increasing evidence suggests that meat eaters *objectify* or de-mentalize animals (i.e., deny that animals have mental properties, such as the capacity to suffer or experience pleasure), particularly when they are confronted by an ostensible contradiction between eating meat and caring about animals (Bastian et al., 2012; Bratanova et al., 2011; Loughnan et al., 2010). For example, in one study (Loughnan et al., 2010), participants were randomly assigned to consume either beef jerky or nuts, and, subsequently, to rate a cow's capacity to suffer. Participants who ate beef rated cows as less capable of suffering than participants who ate nuts, possibly as a means of reconciling their beliefs ("cows don't matter") with their actions ("I eat cows"). Here we sought to test the hypothesis that individuals who tend to de-mentalize animals also tend to rationalize their meat eating.

As a final objective, we sought to show that endorsement of the 4Ns is greater among individuals who tend to endorse anti-egalitarian values and support

hierarchical group-based systems of inequality (Pratto, Sidanius, Stallworth, & Malle, 1994). Some previous research by Allen, Wilson, Ng, and Dunne (2000) suggests that individuals on the higher end of the vegetarian-omnivore continuum (i.e., those who consume higher quantities of meat) tend to be more supportive of inequality in group relationships than individuals on the lower end. In particular, they found modest correlations between omnivore identification and both right-wing authoritarianism (Altemeyer, 1981) and social dominance orientation (SDO; Pratto et al., 1994). Individuals high in SDO are motivated to see their own groups dominate other groups. Arguably, motivations to defend meat consumption may share a common origin with motivations for group-based inequality (i.e., between humans and animals). Thus, we expected 4N endorsement to correlate positively with SDO. However, we also expected 4N endorsement to have explanatory power that extends beyond any relationship it has with SDO, as we expect omnivores low in SDO to also engage in meat-consumption rationalization. Consistent with such a hypothesis, we predicted that 4N endorsement would *negatively* predict mentalizing (attributing mental states to animals) and moral regard for animals, independent of SDO.

Method

Participants and dietary classification. Participants were 171 students from the University of Melbourne, Australia (106 women, 63 men, 2 other or missing; M_{age} = 22.91, SD = 5.11). Participants were recruited from a university campus food hall. Participation was voluntary. Diet was assessed on a continuum rather than as a dichotomous choice (for similar approaches, see Allen et al., 2000; Hamilton, 2006; Rozin et al., 2012). Participants reported one of seven diets ranging from strong identification with meat eating (meat-eater, or omnivore) to restricted omnivore (limited meat intake, e.g., only fish or chicken, no red meat) to strong identification

with meat abstinence (lacto-ovo vegetarian, or vegan). Based on their self-reported diet, participants were divided into three groups (73 omnivores; 40 restricted omnivores; 58 vegetarians and vegans).

Measures.

4N Scale. Sixteen items, four items per N, were generated by three of the authors [JP, SL, HMW], taking inspiration partly from Joy's (2010) discussion of the 3Ns of Justification. The four resulting subscales with their corresponding items and Cronbach's αs were as follows:

- **Natural** ("It is only natural to eat meat", "Our human ancestors ate meat all the time", "It is unnatural to eat an all plant-based diet", "Human beings are natural meat-eaters – we naturally crave meat"; α = .78)
- **Necessary** ("It is necessary to eat meat in order to be healthy", "A healthy diet requires at least some meat", "You cannot get all the protein, vitamins and minerals you need on an all plant-based diet", "Human beings need to eat meat"; α = .87)
- **Normal** ("It is normal to eat meat", "It is abnormal for humans not to eat meat", "Most people eat meat, and most people can't be wrong", "It is common for people to eat meat in our society, so not eating meat is socially offensive"; α = .65)
- **Nice** ("Meat is delicious", "Meat adds so much flavor to a meal it does not make sense to leave it out", "The best tasting food is normally a meat-based dish (e.g., steak, chicken breast, grilled fish)", "Meals without meat would just be bland and boring"; α = .84).

The overall scale had a strong internal reliability (α = .93). Participants rated their level of agreement or disagreement with each item on a 1-7 scale (1 = *completely disagree*; 4 = *neither agree nor disagree*; 7 = *completely agree*).

Moral concern for animals and mind attribution. To examine whether these dietary groups can be distinguished on the basis of how they think about animals, we measured moral concern and mind attribution. To measure moral concern, we adapted the "moral circle" measure from Laham (2009) (see also Bratanova, Loughnan, & Gatersleben, 2012; Loughnan et al., 2010). Participants were presented with a list of 26 animals prefaced with the instruction: "When we think about entities in the world, we might feel a moral obligation to show concern for the welfare and interests of some of those entities. Below is a list of entities. Circle those that you feel morally obligated to show concern for." We used the number of animals circled divided by the total number of possible animals as their *moral concern* score, with higher scores indicating larger moral circles. To assess mind attribution, or more precisely the extent to which people *deny* mental states to food animals, participants were asked to imagine a cow (beef is the most commonly consumed meat in Australia; Australian Bureau of Statistics, 2013) and to rate the extent to which they believe the cow possessed 20 mental capabilities on a Likert scale (1 = *definitely does not possess*; 7 = *definitely does possess*). The scale comprises two dimensions previously identified to capture the way people think about minds (see Gray, Gray, & Wegner, 2007): agency (8 items; e.g., *planning*, *self-control*) and experience (12 items; e.g., *joy*, *hunger*). All 20 items were averaged as our measure of *mind attribution.* The overall reliability of the scale was good (α = .89).

Social dominance orientation. Previous work has identified endorsement of social inequality as an important characteristic in distinguishing between vegetarians

and omnivores (Allen et al., 2000). We therefore measured the extent to which participants possessed system-justifying tendencies such as endorsement of hierarchical group dominance (e.g., "Superior groups should dominate inferior groups"; 1 = *strongly agree*; 7 = *strongly disagree*), using the 16-item Social Dominance Orientation questionnaire (α = .91; Pratto et al., 1994).

Procedure. Participants were recruited by one of the authors [ML] from a university food hall between 10am and 3pm over a two-month period. All people entering the area were approached and asked to participate. On agreement, they were provided with a questionnaire[5], which they completed independently. The order of scales used in the questionnaire was counterbalanced using a Latin-square design, and all items were presented in a standard random order.

Results

Correlations between the 4N scale and other measures can be seen in Table 2. Skewness was an issue particularly for the moral concern and mind attribution measures, due to significant differences in responding as a function of diet. Thus, to reduce Skewness we log transformed scores for these measures prior to calculating Pearson's correlations. The data contained small amounts of missing data where participants did not complete all measures, and this is reflected in the variable degrees of freedom across the analyses.

[Insert Table 2 about here]

4N scale. There was a main effect of diet on overall 4N endorsement, $F(2,168) = 130.22$, $p < .001$, $\eta^2_p = .608$—a very large overall effect. It was predicted that individuals would endorse the 4Ns in relation to their level of meat restriction in

[5] Aquino and Reeds' (2002) 10-item moral identity scale was also included in the questionnaire, and had no clear relationship to the 4N scale. Please contact the authors for more information.

their diet. Consistent with this prediction, omnivores endorsed the 4Ns at a significantly higher rate (M = 4.06, SD = 0.96) than both restricted omnivores (M = 2.58, SD = 0.77) and vegetarians/vegans (M = 1.82, SD = 0.56), and restricted omnivores endorsed the 4Ns significantly more than vegetarians/vegans, $p < .001$ for all comparisons (Tukey's HSD). Consistent with a belief-overkill effect or myside bias, these diet-based differences held across all four subscales, Fs > 59.40, ps < .001, η^2_p = .354-.594; ps < .03 for all groupwise comparisons (see Figure 3).

A few further observations are worth noting. First, of all the Ns, Natural had the highest endorsement ratings among individuals with meat-restricted diets. Second, Normal had the lowest level of endorsement among omnivores. Finally, Nice produced the largest drop in endorsement ratings when comparing omnivores with restricted omnivores and vegetarians/vegans.

[Insert Figure 3 about here]

Moral concern. Diet had an overall effect on moral concern for animals, $F(1,156) = 33.52$, $p < .001$, $\eta^2_p = .302$. As expected, omnivores included fewer animals in their circle of moral concern (M = .52, SD = .32), as compared to both restricted omnivores (M = .72, SD = .35) and vegetarians/vegans (M = .96, SD = .16), Tukey's HSD tests, ps < .002. Likewise, restricted omnivores included fewer animals in their moral circle than did vegetarians/vegans, $p < .001$. Thus, increased adherence to a meat-based diet was associated with less moral concern for animals.

Mind attribution. Diet had an overall effect on mind attribution to animals, $F(2,168) = 21.83$, $p < .001$, $\eta^2_p = .206$. On average, vegetarians/vegans attributed animals more mind (M = 5.51, SD = 0.75) than did omnivores (M = 4.56, SD = 0.85) and restricted omnivores (M = 4.97, SD = 0.82), Tukey's HSD, ps < .005. Likewise, restricted omnivores attributed more mind to animals than did omnivores, p = .029. In

short, increased adherence to a meat-based diet was associated with attributing less mind to animals.

SDO. There was an overall effect of diet on system justification endorsement as measured via SDO, $F(2,168) = 27.09$, $p < .001$, $\eta^2_p = .244$. As expected, omnivores were more likely to endorse exploitative ideologies ($M = 2.87$, SD = 0.98) than were restricted omnivores ($M = 2.01$, SD = 0.70) and vegetarians/vegans ($M = 1.87$, SD = 0.70), Tukey's HSD, ps < .001, who in turn did not differ in SDO, $p = .70$.

Regression analysis. To examine whether 4N endorsement predicted moral concern for animals and mind attribution to animals independent of SDO, we entered the 4N scale and SDO simultaneously into a regression predicting moral concern, and, separately, predicting mind attribution. For both measures, the 4N scale predicted a significant portion of variance independent of SDO: 4N endorsement independently predicted having a *less inclusive* moral circle, $\beta = -.34$, $t(156) = -4.37$, $p < .001$, and attributing *less* mind to animals, $\beta = -.26$, $t(168) = -3.38$, $p = .001$, as did SDO, $\beta = -.31$, $t(156) = -3.99$, $p < .001$, and $\beta = -.30$, $t(168) = -3.86$, $p < .001$ (respectively).

In sum, omnivores endorsed the 4Ns to a greater extent than did individuals who had more meat-restricted diets. This was true across all four Ns. Furthermore, 4N endorsement predicted moral concern for fewer animals and less mentalizing, independent of SDO, though 4N endorsement correlated with SDO. Thus, 4N meat justification appears to be related to inequality justification, but it has predictive value beyond this relationship.

Study 3 – The 4Ns and Other Meat-eating Psychological Defenses

The main aim of Study 3 was to explore the relationship between the 4N scale with another recently developed measure of psychological defenses meat

eaters engage in—Rothgerber's (2013) Meat-Eating Justification (MEJ) scale. The MEJ assesses a number of different psychological strategies, including both direct and indirect strategies. Within Rothgerber's theorizing, direct strategies include *denying* that animals suffer when being raised and killed for meat, a process related to objectification, discussed in Study 2 (e.g., "Animals do not feel pain the same way humans do"); general *pro-meat* appeals (e.g., "I enjoy eating meat too much to ever give it up"); and explicit endorsements of various justifications for eating meat, including *religious justifications* (e.g., "God intended for us to eat animals"), *health justifications* (e.g., "Meat is essential for strong muscles"), *hierarchical justifications* (e.g., "Humans are at the top of the food chain and meant to eat animals"), and *fate or destiny justifications* (e.g., "Our early ancestors ate meat, and we are supposed to also"). From our perspective, many of these justification categories are encompassed by several of the 4N categories, specifically, Natural (hierarchy, fate, religion[6]) and Necessary (health), and the *pro-meat* subscale is quite similar to Nice. Thus, it would be surprising if the 4N scale did not correlate highly with the MEJ-Direct strategies. At the same time, the MEJ also assesses two indirect strategies available to meat eaters, which includes *avoiding* thoughts of animal suffering (e.g., "I try not to think about what goes on in slaughterhouses"), and *dissociating* meat from its origins (e.g., "I do not like to think about where the meat I eat comes from"). Given that the 4N scale is a measure of meat-eating rationalizations, and thus has less in common with these indirect strategies, we refrained from speculating about the 4N scale's relationship with the MEJ-Indirect

[6] The MEJ religion category is operationalized in terms of meat consumption fulfilling God's natural order or God's will for humans to have dominion over animals, which is encompassed by the Natural category in the 4N scheme.

subscale, though we anticipated that its relationship with this subscale would be much weaker than its relationship with the MEJ-Direct subscale.

As a secondary aim we sought to investigate the relationship between 4N endorsement and various food choice motivations, including ethical food choice motivations such as animal welfare or environmental concerns. We predicted that people who endorse the 4Ns should be *less* motivated by ethical concerns when making food choices. Finally, as an exploratory goal, we assessed the role of gender in 4N endorsement.

Method

Participants and diet. We recruited a new sample of 195 adults via Mechanical Turk. All participants were located in the U.S. and were compensated for their participation. Three participants did not complete the survey, leaving a total of 192 (100 women, 83 men, 5 other or missing; M_{age} = 35.74, SD = 13.02). The majority of the sample identified as "omnivores/non-vegetarians" (86%), 9% as "partial vegetarians," and 5% as "other" (e.g., pescetarian). Nine additional participants were recruited that identified as vegetarian or vegan, but due to experimenter error they did not receive the full battery of materials (specifically, they did not receive the MEJ scale), and thus were not included in the analyses reported here (exceptions are footnoted).

Materials and procedures. In the following set order, participants answered several subscales of the Food Choice Questionnaire (FCQ: Health, Familiarity, Sensory appeal, Natural content, and Weight control; only the three-highest loading items from each subscale were administered, 15 items total; see Steptoe, Pollard, & Wardle, 1995), the Animal Welfare and Environmental Protection subscales of the Ethical Food Choice Questionnaire (5 items total;

Lindman & Väänänen, 2000), the Meat-Eating Justification (MEJ) Scale (27 items total; Rothgerber, 2013), and a slightly revised version of the 16-item 4N Scale (one Normal item was reworded; for subscale reliabilities see footnote).[7] In this study, the 4N scale had a strong internal reliability (Cronbach's $\alpha = .94$).

The FCQ presents participants with a number of statements that finish the sentence, "It is important that the food I eat on a typical day…" (e.g., "*...keeps me healthy*"). The Animal Welfare and Environmental Protection subscales follow the same format, as they were designed as an extension of the FCQ (see Lindman & Väänänen, 2000; e.g., *"...has been produced in a way that animals have not experienced pain*"; *"...has been prepared in an environmentally friendly way*"). The scale ranged from 1 = *Not at all important* to 4 = *Very important.*

The MEJ (Rothgerber, 2013) contains nine first-order subscales (pro-meat, deny, dichotomize, fate, religion, health, hierarchy, dissociation, avoid) that can be further divided into two second-order subscales (Direct vs. Indirect strategies). Each first-order subscale contains three items. The *dichotomize* subscale, which was not discussed above, is a first-order MEJ subscale designed to assess the process of dichotomizing (or splitting) animals into different categories, such as "pets" vs. "food animals." As reported by Rothgerber (2013), the dichotomize subscale generally produces the lowest internal reliabilities (αs ranged from .53 to .55), and the dichotomize items tend to load more highly with the direct items than the

[7] For this study, we amended one of the Normal items to avoid a double-barreled phrasing. The item "It is common for people to eat meat in our society, so not eating meat is socially offensive" was amended to simply "In my country, not eating meat breaks social norms." Amending this item led to a slight improvement in the internal reliability of the Normal subscale (Cronbach's $\alpha = .71$). Reliabilities for the other subscales ranged from .81-.95. An exploratory factor analysis of the 4N items, using parallel analysis as our extraction method, revealed a single-factor solution (eigenvalue = 8.77) explaining 54.8% of the total variance. Arguably, a second factor (eigenvalue = 1.59) comprised of just one of the Normal items also emerged. Thus, in the latter studies (see esp. Study 5) we continued to make further improvements to the Normal subscale.

indirect items. Thus, we treated dichotomize as a direct factor. In previous studies, Rothgerber (2013) found that men tend to endorse the MEJ-Direct strategies more so than women, while women tend to adopt the indirect strategies more so than men (the exception being *dichotomize*, which did not differ by gender). It was also found that many of the direct strategies correlated positively with meat consumption (i.e., they functioned successfully as meat-eating defenses), while the indirect strategies often correlated negatively with meat consumption (i.e., they were counter-productive as meat-eating defenses). Rothgerber did not report factor analyses of the MEJ items. Nonetheless, in our sample, the 27 MEJ items factor loaded onto three separate factors (eigenvalues = 8.87, 4.26, 2.00), accounting for 56.1% of the cumulative variance. The first factor was comprised of all of the direct items (including dichotomize items), and the second factor was comprised of all the indirect items. The third factor was comprised of the three religious justification items, which cross-loaded with the first factor. Since all of the religious items loaded more strongly with the first factor than the third factor, we dropped the third factor and aggregated the religious items with the other direct items—which is consistent with Rothgerber's theorizing.

We assessed MEJ in terms of participants' level of agreement or disagreement with the items on a -4 (*Strongly disagree*) to 4 (*Strongly agree*) scale (with 0 = *Neither agree nor disagree*). The same 9-point bipolar scale was used for the 4N scale. Basic demographic information (gender, age, socio-economic status [SES] relative to other Americans) was also collected.

Results

Preliminary analysis. Repeated-measures t-tests between the subscales revealed that Nice (M = 1.23, SD = 1.89) was endorsed to a greater extent than were

the other Ns (all *p*s < .001), followed by Natural (*M* = 0.85, SD = 1.68). Participants endorsed that eating meat is Necessary (*M* = 0.34, SD = 2.23) and Normal (*M* = 0.13, SD = 1.68) at equal levels (*p* = .091), yet lower than endorsement levels for Nice and Natural (*p*s < .001).

Overall, men endorsed the 4Ns more strongly (*M* = 6.02, SD = 1.45) than did women (*M* = 5.36, SD = 1.70), *F*(1, 182) = 8.01, *p* = .005, η^2_p = .042 (we excluded "other gender" participants from the analysis of gender). Respectively, men endorsed Normal (*M* = 5.52, SD = 1.60 vs. *M* = 4.80, SD = 1.70) and Nice (*M* = 6.79, SD = 1.66 vs. *M* = 5.84, SD = 1.91) more than women, *F*s > 8.77, *p*s < .004, η^2_p = .046-.066, but did not differ from women in their endorsement of Natural or Necessary, *F*s < 3.24, *p*s > .07, η^2_p = .015-.017. Consistent with Rothgerber's (2013) findings, overall men scored higher on the MEJ than women (*M* = 5.38, SD = 1.26), *F*(1, 182) = 6.88, *p* = .009, η^2_p = .036, but this was due to men engaging in more direct strategies (*M* = 5.91, SD = 1.20) than women (*M* = 5.09, SD = 1.52), *F*(1, 182) = 15.99, *p* < .001, η^2_p = .081. By contrast, women engaged in more indirect strategies (*M* = 6.40, SD = 1.66) than men (*M* = 5.61, SD = 1.96), *F*(1, 182) = 8.94, *p* = .003, η^2_p = .047. Neither the 4N scale nor the MEJ scale correlated significantly with participants' age or SES (*r*s < .08, *p*s > .29).

The 4N scale correlated moderately to highly with all seven of the MEJ-Direct subscales, but it did not correlate with either of the MEJ-Indirect subscales (see Table 3). The 4N Scale correlated at *r* = .84 with the overall MEJ-Direct scale, and *r* = -.04 with the MEJ-Indirect scale. This makes sense theoretically, as the indirect strategies of dissociating or avoiding thoughts of animal suffering are passive responses, whereas the direct strategies involve many explicit rationalizations, much like the 4Ns. It is not surprising then that the MEJ-Pro-meat,

MEJ-Hierarchy, MEJ-Fate and MEJ-Health subscales have the highest correlations with the 4N scale, given their similarities with the 4N-Nice, 4N-Natural and 4N-Necessary subscales.

[Insert Table 3 about here]

Food choice motivations. Table 4 depicts the correlations between the 4N scale and the various food-choice motivations, and the same for the MEJ scale. With regards to non-ethical motivations, people who selected food on the basis of its familiarity were more inclined to endorse the 4Ns. With regards to ethical motivations, as predicted, individuals who were concerned about the environment, and to a lesser extent animal welfare, were *less* inclined to endorse the 4Ns.[8] The MEJ behaved very similarly to the 4N scale, with the addition that the MEJ correlated negatively with natural content motivations as well (see Table 4).

[Insert Table 4 about here]

In sum, men endorsed the 4Ns to a greater extent than did women. The 4N scale correlated with other types of meat-eating justifications and defenses, as measured by the MEJ-Direct subscale, but endorsement of the 4Ns was unrelated to dissociation and avoidance meat-eating strategies. Additionally, individuals who endorsed the 4Ns were motivated to make food choices on the basis of the familiarity of the food, while individuals who rejected the 4Ns were motivated to select foods that promote animal and ecological welfare. Similar results were obtained for the MEJ-Direct subscale. Although the two scales have some overlapping components, we believe the 4N scale has several distinct methodological strengths, which we discuss at length in the General Discussion.

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[8] When the nine vegetarians/vegans were included in the analysis the correlation between animal welfare and the 4Ns was significant, $r(199) = -.18$, $p = .011$, as was the correlation between environmental protection and the 4Ns, $r(199) = -.21$, $p = .003$.

Study 4 – The 4Ns, Animals-Product Choices, Moral Emotions and Self-Appraisals

Studies 2-3 provided some initial evidence that individuals who reject the 4Ns tend to have more meat-restricted diets (Study 2), are more concerned with the welfare of animals (Study 2), and are motivated by ethical concerns when making food choices (Study 3). The aim of Study 4 was to demonstrate in a more comprehensive manner the role of 4N endorsement in people's dietary and lifestyle practices involving animal products, as well as the self-directed emotions (e.g., guilt, pride) and appraisals generated from these practices. We also sought to correlate 4N endorsement with a person's level of involvement in animal-welfare advocacy and their endorsement of Speciesist attitudes (i.e., prioritizing human interests above animal interests; see e.g., Singer, 2009). To this end, we recruited a more heterogeneous sample that included full vegetarians and vegans, in addition to omnivores and semi-vegetarians who were concerned to some degree about their consumption of animal products.

We predicted that 4N endorsement would be *negatively* related to (a) taking active steps towards restricting one's use and consumption of animal products, (b) animal-welfare advocacy, and (c) experiencing pride and appraisals of moral self-regard in relation to one's animal-product consumption. By contrast, we predicted that 4N endorsement would be *positively* related to (d) the endorsement of Speciesist attitudes towards animals. With regards to guilt experienced due to one's consumption of animal products, we were uncertain how 4N endorsement would relate to this variable. If Joy (2010) is correct that meat-eating justifications serve to "alleviate the moral discomfort we might otherwise feel when eating meat" (p. 97), then we might expect a *negative* relationship between guilt and 4N endorsement. But

this may be only true when focusing on omnivores, since the pride vegetarians and vegans experience with regards to their dietary practices may act as a counterweight to any guilt they might otherwise experience.

Method

Participants and diet. A total of 215 participants (119 women, 96 men; M_{age} = 31.89, SD = 10.7) participated in a twenty minute survey in exchange for suitable payment. Participants were recruited online via Mechanical Turk. Recruitment materials described the study as "a series of questions about your consumption/use of animal products, particularly concerns you may have about restricting or not restricting various animal products." A pre-screening questionnaire filtered out potential participants who consumed all kinds of meat and other animal products and who had no concerns about doing so. The aim was to recruit only individuals who had some misgivings or ambivalence about consuming animal products. The participant pool included only those who rejected at least one type of animal-based food product, or omnivores who were considering restricting their consumption of animal products though currently not refraining from animal-product consumption.

There were two waves of recruitment. Both waves were conducted through Mechanical Turk. In the initial wave, 182 participants completed the survey. A second wave was deemed necessary to increase the number of vegetarians and vegans collected. In the second wave, conducted a week after the first, a pre-screening questionnaire filtered out participants who identified as omnivores or semi-vegetarians. An additional 33 vegetarian and vegan participants completed the survey in the second wave. The final sample consisted of 57 participants who self-identified as omnivores, 90 as semi- or partial vegetarians, 44 as vegetarians, 16 as strict vegetarians/dietary vegans, and 8 as lifestyle vegans.

Materials and procedures.

Current diet. For the purpose of the survey, participants were instructed that "animal products" refers to anything that comes from an animal, including meat, dairy, eggs, honey, leather, fibers (wool, silk, etc.), and animal-derived ingredients that are used in a variety of products, such as toiletries. Participants indicated their current dietary practices with respect to animal products by selecting one diet from a list of five: "Omnivorous," "Semi- or Partial Vegetarian," "Vegetarian," "Strict Vegetarian or Dietary Vegan," or "Lifestyle Vegan" (definitions for each category were provided, see Appendix A). Participants also indicated which animal products they currently rejected (i.e., "do not consume or use") from a list of thirteen.[9]

4N scale. The 16-item 4N scale from Study 2 was used to assess 4N endorsement. Each statement was presented in a randomized order and assessed in terms of level of agreement on a seven-point scale (1 = *Strongly disagree*; 7 = *Strongly agree*). Overall, the sixteen items of the 4N scale had a high internal reliability (α = .94).[10] The overall mean for the scale (see Table 6) was lower than in previous studies, most likely due to the greater sampling of vegetarians and vegans, and the omission of omnivores who have absolutely no concern about consuming animal products.

Restriction of animal products. We assessed the degree to which participants were moving towards increasing or decreasing the level of animal-

[9] Overall, 64% reported currently rejecting red meat (beef, veal, etc.), 61% rejected pork, 44% rejected seafood, 41% rejected fish, 35% rejected poultry, 20% rejected dairy products, 18% rejected eggs, 69% rejected the use of fur, 48% rejected non-food products tested on animals, 41% rejected leather goods, 31% rejected non-food products containing animal ingredients, and 20% rejected other animal-based fibers (wool, silk, etc.); overall, 97% of the sample currently rejected at least one animal product.

[10] The internal reliabilities (Cronbach's α) for each of the 4N subscales ranged from good to excellent (Natural α = .80; Nice α = .89; Necessary α = .92), with the exception of Normal, which had a below satisfactory internal reliability (α = .63). In the final study, we aimed to improve upon several of the Normal subscale items.

product restrictions they were engaging in within the past five years, with a single question: "How would you describe the general direction of your changes with respect to your consumption/use of animal products over the last 5 years?" Answers were made along a 1-7 scale (1 = *Strongly moving towards less restrictions*; 4 = *Fluctuating between restricting and not restricting*; 7 = *Strongly moving towards more restrictions*), with higher scores representing movement towards greater restriction. Only participants who indicated that they had changed their diets in the past five years answered this question. Participants who indicated they had not changed their diet in the past five years were assigned a score of 4 (thus, a score of 4 represented either no change or fluctuation between restricting and not restricting animal products).

Pride, guilt, discomfort, and moral self-regard. We included four measures of people's emotional and self-appraisal correlates related to their consumption and use of animal products. These reflected self-conscious moral emotions (guilt, pride) and moral self-appraisals participants might experience with regards to these dietary and lifestyle choices. Participants indicated how proud, guilty, and uncomfortable they felt with regard to their current animal-product decisions, on a 1-7 scale (e.g., 1 = *Not at all proud*; 7 = *Extremely proud*). Additionally, they rated on a nine-point scale how accurately a series of six moral-character traits described them in relation to their animal-product decisions: *inconsistent*, *principled*, *reliable*, *committed*, *dedicated*, and *hypocritical*. The overall reliability of the scale was high ($\alpha = .90$), thus, the six traits were aggregated to form a *moral self-regard* index (*inconsistent* and *hypocritical* were reverse scored). See Table 6 for descriptive statistics and correlations pertaining to these four measures.

Animal-welfare advocacy. We included three measures of animal-welfare advocacy, measured on six-point scales. These items encompassed tendencies to experience negative affect when witnessing animal-welfare violations or attempts to influence others' animal-product consumption. Participants were asked how often they tried to convince others to limit or reject some or all animal products (1 = *Never*; 6 = *All of the time*); how upset they are when eating with others who are consuming animal products that they reject (1 = *Not at all upset*; 6 = *Extremely upset*); and how angry they are when they see someone wearing a fur coat (1 = *Not at all angry*; 6 = *Extremely angry*). The three items were fairly well inter-correlated (*r*s ranged from .39 to .53; $\alpha = .62$), thus, we aggregated them into a single *animal-welfare advocacy* index.

Speciesism. Speciesist attitudes (prioritizing human interests over animal interests) were measured with five items (see Appendix B). Agreement with the items was measured on a 1-7 scale (1 = *Strongly disagree*; 7 = *Strongly agree*), with higher values representing greater endorsement of Speciesism. The five items were internally reliable (Cronbach's $\alpha = .84$), thus, they were aggregated to form an index of Speciesism endorsement. Descriptive statistics for the index may be found in Table 5.

Additional measures. The present study was part of a student's independent research project on dietary choices and included some additional measures that were of less relevance to the present purposes. This included, for instance, a number of questions about which kinds of animal products participants were planning to restrict or resume using in the future, their motivations for doing so, measures of family and social support of their dietary choices, involvement in vegetarian/vegan or animal welfare groups, their willingness to consume insect-based food as an

alternative to traditional meat products, qualitative self-evaluations of any inconsistencies in their dietary behavior, and an assessment of meaning in life (the 4N scale was unrelated to this measure). For brevity's sake, we do not report on these measures. Please contact the authors for more information.

[Insert Table 5 about here]

Results

Diet and 4Ns. Figure 4 depicts the mean 4N scale scores (and standard errors) by diet. Diet had a large, overall effect on 4N endorsement, $F(1,211) = 38.76$, $p < .001$, $\eta^2_p = .36$. As we predicted, omnivores had the highest 4N scores, followed by semi-vegetarians (see Figure 4). Vegetarians and dietary and lifestyle vegans had the lowest 4N scores. All post hoc comparisons (Tukey HSD tests) were significant at $p < .001$, except the comparison of vegetarians and dietary/lifestyle vegans, which did not at all differ, $p = .906$.

[Insert Figure 4 about here]

Correlates of the 4Ns. Table 5 presents correlations between the overall 4N scale, Speciesism endorsement, the emotion and self-appraisal measures pertaining to participants' consumption/use of animal products, animal-welfare advocacy, and animal product restriction. As expected, the 4N scale was negatively correlated with animal-welfare advocacy and animal product restriction. In other words, individuals who endorsed the 4Ns were less involved in animal-welfare advocacy and were less likely to be moving towards more restrictions with regards to animal product consumption. Also as predicted, the 4N scale was positively correlated with Speciesism. That is, individuals who endorsed the 4Ns tended to hold Speciesist beliefs. Critically, the relationship was moderate in strength, which suggests that 4N endorsement is a distinct construct from Speciesism. Additionally, the 4N scale was

negatively correlated with pride in one's animal-product decisions, and negatively correlated with moral self-regard derived from such decisions. That is, people who endorsed the 4Ns experienced less pride and less moral self-regard with respect to their animal-product decisions. With all dietary groups included in the analysis, 4N endorsement was uncorrelated with guilt and discomfort over one's animal-product decisions. However, when restricting the sample to just omnivores, 4N endorsement was *negatively* correlated with guilt experienced in relation to one's diet, $r(55) = -.40$, $p = .002$, though the negative relationship was not significant for discomfort, $r(55) = -.16$, $p = .246$. Thus, omnivores who strongly endorsed the 4Ns experienced less guilt about their dietary practices than did omnivores who endorsed them to a lesser degree.

It is worth noting that the 4N scale correlated more strongly than did the Speciesism scale with all of the outcome measures, with the exception of animal-welfare advocacy. Speciesism had a weak negative correlation with guilt and animal product restriction, and a moderate negative correlation with animal-welfare advocacy, suggesting that the more a person endorses Speciesism, the less guilty they feel about their consumption of animal products, the less inclined they are to increase their restriction of animal products, and the less likely they are to engage in animal-welfare advocacy.

In sum, 4N endorsement predicted a number of outcomes related to animal-product consumption, animal-welfare advocacy, Speciesist attitudes, and the self-directed emotional corollaries of engaging in choices pertaining to animal-product restriction. Critically, there was a negative relationship between 4N endorsement and guilt over one's animal-product choices among omnivores, suggesting that 4N justifications assist with effective guilt regulation.

Study 5 –Test-Retest Validity of the 4N Scale and Actual Meat Consumption

So far we have shown 4N endorsement to be consistently higher among individuals who self-identify as omnivores than among individuals who identify as partial vegetarians, full vegetarians, and vegans. In Study 5, we sought to show that endorsement of the 4Ns correlates with the frequency with which people consume meat and other animal products in their diet. Consistent with the idea that 4N justifications are rationalizations fueled by a desire to continue eating meat, we also sought to show that 4N endorsement would highly correlate with a person's explicit commitment to eating meat. Finally, to polish off the items comprising the 4N scale, we made minor adjustments to several of the Normal items (in Studies 2-4 the Normal subscale consistently had the lowest Cronbach's αs), and we administered the final version of the 4N scale to the same sample at two different time points to establish the instrument's test-retest reliability.

Method

Participants and diet. At Time 1 we recruited a new sample of 236 adults (74 women, 162 men; M_{age} = 29.67, SD = 8.05) via Mechanical Turk. All participants were located in the U.S. and paid for participating in a short, two-part study. At Time 1, participants were informed that they would be taking part in a two-part study. Eleven days later participants were contacted by email and invited to complete Part II. Participants were given a span of three days to complete Part II. They were given a security password to enter the survey. In order to anonymously link their responses from Parts I and II, participants were instructed to generate a unique, memorable code to enter at Time 1 and Time 2 (emails were also collected at both time points to help link responses).

One-hundred and thirty-six participants (47 women, 89 men) completed both parts of the study (a 58% return rate). The vast majority of participants at Time 1 and Time 2 classified themselves as omnivores ("I eat meat and other animal products, like dairy and/or eggs") (Time 1: 88%; Time 2: 90%). The next largest dietary category was semi-vegetarian ("I eat meat, but only on rare occasions or only certain types of meat") (Time 1: 6%; Time 2: 3%). A few participants were full vegetarians or vegans (Time 1: 6%; Time 2: 7%).

Materials and procedures. The surveys comprising Parts I and II were identical. First, participants answered a slightly revised version of the 16-item 4N scale. Two of the most problematic Normal items were amended in an attempt to improve the subscale's internal reliability. In order to make it more generally applicable, the item "In my country, not eating meat breaks social norms" was amended to "Not eating meat is socially unacceptable." To avoid a double-barreled phrasing, the item "Most people eat meat, and most people can't be wrong" was amended to "Most people I know eat meat" (see Table 8 for a final list of items). Agreement with the 4Ns was assessed on a 1-7 scale as in Study 4. The 4N scale was followed by a dietary questionnaire assessing the average number of days per week (1-7) they ate various animal products (beef, pork, lamb, chicken, fish, seafood, eggs, dairy) and non-animal products (bread, rice, vegetables, fruit). We included non-animal food products as a test of discriminant validity; the 4N scale should only correlate with animal-product consumption. Next they responded to a 7-item Meat Commitment Scale (MCS) developed by the authors (see Appendix C for items). Lastly, they answered a basic demographics questionnaire. They were debriefed and paid at both time points.

Results

4N intercorrelations and internal reliability. All 4N subscales correlated strongly with the full scale (rs = .86-.93, ps < .001), and with each other (rs = .69-.81, ps < .001). The correlations between the 4N subscales ranged from .69 to .81, all significant at $p < .001$. The Cronbach's α of the full scale was .95 at Time 1 and .94 at Time 2.

Factor Analysis. A principal components factor analysis of the 4N scale suggested a single-factor solution (eigenvalue = 8.93, explaining 55.8% of the total variance). All 16 items loaded together above .30 (see Table 6 for factor loadings, means and standard deviations). The item "Not eating meat is socially unacceptable" had the lowest loading, probably due to the quite low endorsement of this item.[11] The two lowest loading items, both from the Normal subscale, cross-loaded with a potential second factor (eigenvalue = 1.65; 10% of the total variance).[12] In the General Discussion, we speculate as to why these two items behaved somewhat differently from the others.

[Insert Table 6 about here]

Test-retest reliability of 4N scale. The overall test-retest reliability of the full 4N scale was strong, $r(134) = .93$, $p < .001$. Table 9 depicts the test-retest correlations for each of the subscales. The rs ranged from .71 (Normal) to .92 (Nice), with all rs significant at $p < .001$. Thus, the 4N scale had strong test-retest reliability over a period of about two weeks. The Normal subscale had the weakest test-retest reliability, though it reached adequate levels of reliability.

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[11] One potential suggestion for improving this item in the future would be to phrase it in terms of the acceptability of eating meat, rather than the unacceptability of not eating meat.

[12] We conducted a confirmatory factor analysis omitting the two lowest loading Normal items, treating the remaining fourteen items as members of a single latent "meat-justification" factor. This model provided a less than adequate fit to the data, with $\chi^2(77) = 547.66$, $p < .0001$, RMSEA = .161, CFI = .831. However, the fit of the baseline model, compared to the saturated model, was much worse, with $\chi^2(91) = 2873.90$, $p < .0001$. An alternative model with four distinct latent variables (the 4N categories) with four items each could not be run as convergence was not achieved (due most likely to too few items).

[Insert Table 7 about here]

4N endorsement. Repeated-measures t-tests were carried out on the 4N subscale means. Nice (M = 5.02, SD = 1.54) was endorsed at the highest level, and at a level significantly higher than the other three Ns, ps < .001. Next, Natural (M = 4.80, SD = 1.41) and Normal (M = 4.72, SD = 0.94) were endorsed at equal levels, p = .165, and at levels significantly greater than Necessary (M = 4.16, SD = 1.76), ps < .001, which had the lowest level of endorsement. Overall, men endorsed the 4Ns to a significantly greater extent than did women (M_{men} = 4.79, SD = 1.23 vs. M_{women} = 4.43, SD = 1.33), $F(1, 234) = 4.15$, $p = .043$, $\eta^2_p = .017$. Men had higher means for all 4Ns though only for Natural and Normal were the means significantly higher than for women.

Commitment to eating meat. The MCS had a strong test-retest reliability of $r(134) = .93$, $p < .001$, and a strong internal reliability, Cronbach's $\alpha = .96$ (Time 1), $\alpha = .96$ (Time 2). Men were significantly more committed to eating meat (M = 4.87, SD = 1.70) than were women (M = 4.39, SD = 1.80), $F(1, 234) = 4.07$, $p = .045$, η^2_p = .017, which is consistent with much past research (e.g., Fagerli & Wandel, 1999; Rappoport, Peters, Downey, & McCann, 1993; Rothgerber, 2013; Ruby & Heine, 2012). As can be seen in Table 8, the full 4N scale highly correlated with a commitment to eating meat.[13] As an exploratory analysis, we entered each of the 4N subscales simultaneously into a regression predicting MCS ratings at Time 1.[14] Multi-collinearity was a concern, but it was not so problematic to make the test unreliable (Tolerance range: .22-.38; VIF range: 2.63-4.51). All four subscales were positively predictive of a commitment to eating meat (βs: Natural = .07; Necessary = .10;

[13] 4N endorsement at Time 1 also highly correlated with meat commitment at Time 2, $r(134) = .83$, $p < .001$.

[14] We did not conduct a comparable analysis with Time 2 scores due to loss of power.

Normal = .08; Nice = .14); however, only the Necessary and Nice subscales were significant, independent predictors, *p*s < .05 (all other *p*s > .13).

[Insert Table 8 about here]

Meat consumption. As can be seen in Table 8, the 4N scale selectively correlated with measures of the frequency with which participants consumed animal products, but it did not correlate with consumption frequencies for non-animal food products. The correlations were strongest for meat products (e.g., beef, chicken, pork), but were significant for eggs and dairy products as well. Of the 4Ns, endorsement of Necessary was the most reliable correlate of animal-product consumption. It significantly correlated with the consumption of all eight categories of animal products.

General Discussion

Morally motivated vegetarians, although a minority, may serve as a source of implicit moral reproach for many omnivores, eliciting behaviors designed to defend against moral condemnation (Minson & Monin, 2012). One method for rendering moral vegetarians nonthreatening, examined here, is to rationalize or provide reasonable justification for one's consumption of animal products. The present research built upon the theorizing of Joy (2010) pertaining to the 3Ns of Justification—that eating meat is natural, normal, and necessary. To this list, we added a fourth N—that eating meat is nice (i.e., enjoyable, satisfying, etc.). Consistent with this theorizing, Studies 1a-1b identified the 4Ns (Natural, Normal, Necessary and Nice) as the principal justifications used to argue for the acceptability of eating meat. Furthermore, Studies 2-5 documented the relationship between 4N endorsement and a number of important variables related to meat consumption and animal-welfare concerns.

Overall, omnivores tended to endorse the 4Ns more so than partial vegetarians, full vegetarians, and vegans (Studies 2 and 4). Moreover, individuals who tended to endorse the 4Ns included fewer animals in their circle of moral concern (Study 2), attributed fewer mental capacities to cows (Study 2), were more tolerant and supportive of social inequality (Study 2), were less motivated by ethical concerns when making food choices (Study 3), were less active in advocating on behalf of animals (Study 4), held Speciesist attitudes more strongly (Study 4), were less proud of their consumer choices pertaining to animals (Study 4), were less likely to be moving towards greater restriction of animal products in their diet (Study 4), tended to consume meat and other animal products more frequently in their weekly diet (Study 5), and tended to be highly committed to eating meat in the future (Study 5). Furthermore, omnivores who strongly endorsed the 4Ns tended to experience less guilt with regards to their animal-product choices than did omnivores who endorsed the 4Ns to a lesser extent (Study 4), suggesting that the 4Ns are effective for reducing guilt. Consistent with theorizing by Joy (2010), it would seem that the 4Ns are a powerful, pervasive tool employed by individuals to diffuse the guilt one might otherwise experience when consuming animal products.

Implications for omnivore-vegetarian discourse

In Study 2, we observed that omnivores tended to endorse all four of the Ns, while vegetarians and partial-vegetarians tended not to endorse them, or to endorse them to a much lesser degree. In other words, rather than participants independently agreeing with one another about the validity of a few of the Ns, participants tended to endorse or reject every available justification that was consistent with their position, reflecting a myside bias or belief-overkill effect (see also Baron, 1995; Stanovich et al., 2012). Nonetheless, the Ns that produced the greatest levels of

disagreement across dietary groups were Necessary and Nice. This suggests that beliefs about the necessity of eating meat, and the pleasure derived from eating meat, may be the least persuasive of the 4Ns in convincing a vegetarian audience. It also suggests, as we observed in Study 5, that Necessary and Nice may be the most useful N for predicting divergent dietary attitudes. By contrast, endorsement of the naturalness of eating meat (e.g., that human beings have evolved body structures adapted to eating meat) was the most uniform across dietary groups, in that it produced the highest ratings of endorsement among vegetarians (though still below the mid-point). In other words, the belief that it is natural to eat meat may be most widely accepted of the 4Ns as having a factual basis. We might speculate that beliefs about the naturalness of eating meat may be the most persistent and difficult to overturn. Looking to the future, independent manipulations of the 4Ns would help clarify these issues.

Future research might also test which of the 4N justifications present the greatest challenge to meat-reduction campaigns aimed at promoting healthy and environmentally sustainable eating habits. Based on our observations, we would speculate that the perceived necessity of meat consumption may be the most formidable of the 4Ns given that it is frequently offered in defense of eating meat (Studies 1a-1b) and strongly endorsed by omnivores as a justification (Studies 2-5), though we acknowledge as others have (e.g., Lea & Worsely, 2001) that the niceness, or hedonic pleasure, derived from meat is another formidable obstacle.

The 4N scale and the MEJ scale

The scale we developed for assessing endorsement of the 4Ns on a continuum consistently showed strong internal reliability and, in Study 5, strong test-retest reliability. The four subscales, for the most part, loaded onto a single

907 factor, with the possible exception of the Normal subscale, which had two items that
908 loaded to the overall scale at lower levels. These two items ("Most people I know
909 eat meat", "Not eating meat is socially unacceptable") are distinct from the other
910 scale items in that they may be understood simply as statements of fact or
911 observations rather than opinions or attitudes. As a consequence, individuals with
912 different dietary orientations living within the same societal context could
913 potentially share high-levels of overlap in their endorsement (or non-endorsement)
914 of these items, and this may explain their distinct factor loadings. Indeed, the
915 relatively extreme means for these two items (see Table 6) is consistent with this
916 supposition. Given the recurrently lower loadings of these two Normal items, we
917 recommend continued efforts to improve their loadings, for example, by rephrasing
918 the items (e.g., "Eating meat is an acceptable practice in my society").
919 Importantly, the overall 4N scale correlated strongly with motivations to
920 continue eating meat and with actual meat consumption, confirming its predictive
921 validity. In Study 3, we observed moderate to strong positive correlations between
922 the 4N scale and the Direct-strategies subscale of Rothgerber's (2013) MEJ scale.
923 Furthermore, both the 4N scale and the MEJ-Direct scale correlated *negatively* with
924 ethically motivated food choices (i.e., people who endorsed the 4Ns or who engaged
925 in direct meat-eating justification strategies made food choices that were *less*
926 motivated by ethical concerns for animals or the environment).
927 Although there is some redundancy between the two scales, we submit that
928 there are several favorable strengths to the 4N scale in relation to the MEJ. First, as
929 we have shown in Studies 1a-1b, the 4Ns comprise the bulk of real-world
930 justifications omnivores volunteer in defense of eating meat. As such, the 4N
931 scheme represents a parsimonious way of classifying the principal justifications

supporting meat consumption. For example, Natural in the 4N classification encompasses several of the MEJ subscales, including hierarchy, fate, and religion. Second, the 4N scheme includes one major justification category largely missing from the MEJ—that eating meat is *normal*. Finally, the factor structure of the 4N scale is more internally coherent than the factor structure of the MEJ. Conceptually, the MEJ scale is purportedly measuring nine lower-order, or two higher-order, constructs (see Rothgerber, 2013), while the 4N scale is arguably measuring one construct (meat-eating rationalizations) with four subcomponents. Consistent with this conceptualized structure, we consistently obtained single-factor structures for the 4N scale. By contrast, the MEJ produced two, possibly three, independent factors (see Study 3).

In short, the 4N scheme is conceptually and empirically parsimonious as a measure of meat-eating justifications. By contrast, the MEJ is conceptually and empirically complex, as it is intended to capture other, indirect strategies for continuing in the practice of eating meat beyond rationalization, including avoidance, dissociation, and dichotomizing. Thus, we recommend using the 4N scale when the focus of a research team is on rationalizing meat-eating in particular, while the MEJ may be more suitable for researchers whose aims are broader.

Limitations and future directions

The present research has a number of limitations. In particular, the studies recruited participants either from the US or Australia where omnivores are the dominant dietary group. Although we sampled individuals reporting a diverse variety of dietary practices, from no meat restriction to complete restriction of all meat and other animal products, it would be interesting to compare endorsement of the 4Ns at the level of nations rather than simply at the level of individuals. Given

957 the high rates of vegetarianism in India (European Vegetarian Union, 2008), a
958 country-level comparison between Indian and Western samples would be helpful in
959 illuminating the structural role of 4N rationalization in maintaining omnivorous
960 diets at the societal level. For instance, there are likely to be society-level
961 differences regarding the perceived necessity and normalness of eating meat, which
962 may predict variability in meat consumption across societies. Additionally, the 4N
963 scale may be limited by its treatment of "meat" in a general manner, as opposed to
964 assessing beliefs about specific meat products. This might be a limitation when
965 comparing results from the 4N scale across cultures, as people from different
966 cultures may use different prototypes or exemplars of "meat" when answering the
967 scale. For example, some cultures may have fish and seafood more centrally located
968 in their concept of meat than other cultures. Preliminary research conducted by our
969 team suggests that at least some Americans (32%) spontaneously think of seafood
970 products when asked to list different types of meat. Given the heterogeneity in
971 thinking about meat, future research using the 4N scale would benefit from
972 comparing 4N endorsement across different meat categories.
973 The present studies are also limited by their predominantly correlational
974 methodologies. In the future it would be useful to examine meat-eating
975 rationalization processes *in situ*, that is, in relation to behavioral manipulations of
976 meat consumption or consumer motivation, as has been done within some animal
977 objectification studies (e.g., Bastian et al., 2012; Loughnan et al., 2010). Based on
978 evidence gathered here, we would expect behavioral manipulations of meat
979 consumption or consumer motivations to increase levels of 4N endorsement relative
980 to the consumption of non-animal products, and, conversely, manipulations of the
981 4Ns to decrease the discomfort an omnivore may experience with regards to their

meat consumption. We might also predict that manipulating perceptions of the validity of various Ns (e.g., the necessity of eating meat) would impact willingness to consume meat. Such findings would demonstrate that the 4N rationalizations are not simply post hoc arguments (see Haidt, 2001) but can play a causal role in people's decision-making. Finally, further research is also needed to explore the role of 4N rationalizations in other contemporary controversies beyond diet and animal-welfare concerns.

Conclusion

The relationships people have with animals are complicated. While most people enjoy the company of animals and billions of dollars are spent each year on pet care and maintenance, most people continue to eat animals as food (Herzog, 2010; Joy, 2010). People employ a number of strategies to overcome this apparent contradiction in attitude and behavior (Loughnan et al., 2014). As we have seen here, one important and prevalent strategy is to rationalize that meat consumption is natural, normal, necessary, and nice. Rationalizing enables omnivores to continue in a dietary practice that has increasingly come under public scrutiny. It is difficult to predict whether endorsement of the 4Ns will decrease over time. However, like many controversial issues (see Liu & Ditto, 2013), as attitudes towards meat consumption shift, so too may the beliefs that support them.

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Appendix A

Descriptions of Diet Categories Used in Study 4

Diet	Description
Omnivorous	Consume animal products, except those excluded for taste preference, medical (e.g., allergy, intolerance), and/or religious reasons.
Semi- or Partial Vegetarian	Consume some, but not all, of the following: red meat (beef, veal, etc.), pork, poultry, fish, and/or seafood. Consume eggs and dairy products.
Vegetarian	Never consume red meat (beef, veal, etc.), pork, poultry, fish, or seafood, but may consume eggs and/or dairy products.
Strict Vegetarian or Dietary Vegan	Never consume any animal products, including red meat (beef, veal, etc.), pork, poultry, fish, seafood, eggs, dairy products, or other animal products (e.g., gelatin, casein, etc.).
Lifestyle Vegan	Never consume any animal products, and avoid some or all non-food animal products (e.g., leather, silk, cosmetics containing animal ingredients, etc.) and/or products tested on animals.

Appendix B

Speciesism Scale Used in Study 4

1. We should always elevate human interests over the interests of animals.
2. When human interests conflict with animal interests, human interests should always be given priority.
3. We should strive to alleviate human suffering before alleviating the suffering of animals.
4. The suffering of animals is just as important as the suffering of humans. (reverse scored)
5. Having extended basic rights to minorities and women, it is now time to extend them also to animals. (reverse scored)

Appendix C

Meat Commitment Scale Used in Study 5

1. I don't want to eat meals without meat.
2. When choosing food, I virtually always select the meat option.
3. I can't imagine giving up meat.
4. I am committed to eating meat.
5. The best part of most meals is the meat portion.
6. I would never give up eating meat.
7. I cannot imagine substituting meat from a meal.

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Tables

Table 1

Coding scheme used to score participants spontaneous meat-eating justifications in Studies 1a-1b.

Category	Definition	Examples
Natural	Appeals to biology, biological hierarchy, natural selection, human evolution, or the naturalness of eating meat.	"It is natural for humans to eat meat"; "Humans are carnivores"; "Evolutionarily hominids have always eaten meat"; "Organisms consuming each other is something that is prevalent in nature"; "Humans were meant to have dominion over animals"
Necessary	Appeals to the necessity of meat for survival, strength, development, health, animal population control, or economic stability.	"Humans need meat to survive"; "Our bodies need the protein"; "Meat provides good nutrients"; "Protein is a necessary part of our diet"; "Because if we didn't, there would be an overabundance of certain animals"
Normal	Appeals to dominant societal norms, normative behavior, historical human behavior, or socially constructed food pyramids.	"Society says it's okay"; "I was raised eating meat"; "Meat is culturally accepted"; "A lot of other people eat meat"
Nice	Appeals to the tastiness of meat, or that it is fulfilling or satisfying.	"It tastes good"; "It's delicious"; "Tastes great (I mean bacon…come on)"
Humane	Appeals to the "humane" nature of	"As long as you know it comes from a

Slaughter	slaughtering practices.	company that does not mistreat animals"; "Humane options exist for meat products"
Religion	Appeals to religion, scripture, God, or divine sovereignty, without also appealing to human nature, biology, or social norms.	"It's allowed by my religious creed"; "According to God there is no unclean animals to eat"; "God provided them for us to eat"
Sustainable	Appeals to the sustainable nature of meat as a renewable resource.	"Fish create less waste than other animals"
Miscellaneous	Miscellaneous arguments (e.g., appeals to dietary freedom, availability of meat, inferiority of animals, etc.).	"It's readily available"; "The animals are already killed"; "Animals are not nearly as intelligent as humans"; "This is America and I am free to do what I want"
Unscorable	Does not answer the question or rejects the premise that eating meat is not OK.	"I am not a vegetarian"; "It's not morally wrong"

Table 2

Correlations between the 4N scale and other measures in Study 2

	2	3	4
1. 4N scale	-.47***	-.37***	.52***
2. Moral concern	-	.44***	-.45***
3. Mind attribution	-	-	-.44***
4. SDO	-	-	-

Note. *** $p < .001$. SDO = Social Dominance Orientation. *N*s = 159-171.

Table 3

Pearson correlations between 4N scale and MEJ subscales (Study 3).

	MEJ Direct							MEJ Indirect	
	Pro-meat	Deny	Dichot.	Fate	Religion	Health	Hierarchy	Dissoc.	Avoid
4N Scale	.71***	.58***	.34***	.78***	.49***	.84***	.70***	.06	-.14

Note. *** $p < .001$. *N*s = 192 non-vegetarians/vegans. MEJ = Meat-Eating Justification (Rothgerber, 2013).

Table 4

Pearson correlations between 4N scale and food choice motivations (Study 3).

	Non-ethical Motivations					Ethical Motivations	
	Health	Familiarity	Sensory appeal	Natural content	Weight control	Animal Welfare	Environmental Protection
4N scale	-.10	.24***	.11	-.09	.09	-.10	-.16*
MEJ scale	-.13	.24***	.14	-.19**	.06	-.12	-.23**

Note. * $p < .05$. ** $p < .01$. *** $p < .001$. Non-ethical motivations from FQC (Steptoe et al., 1995); ethical motivations from Lindeman and Väänänen (2000). *N*s = 192 non-vegetarians/vegans.

Table 5

Correlations between 4N scale and measures from Study 4.

	Mean (SD)	2	3	4	5	6	7	8
1. 4N scale	3.30 (1.28)	.42***	-.22**	.08	.03	-.24**	-.25***	-.41***
2. Speciesism	3.55 (1.31)	-	-.10	-.17*	-.10	-.09	-.36***	-.19**
3. Pride in animal-product decisions	4.69 (1.68)	-	-	-.45***	-.15*	.63***	.23**	.28***
4. Guilt about animal-product decisions	2.75 (1.58)	-	-	-	.31***	-.61***	.09	-.22**
5. Discomfort over animal-product decisions	2.70 (1.64)	-	-	-	-	-.28***	.10	-.05
6. Moral self-regard derived from animal-product decisions	6.31 (1.77)	-	-	-	-	-	.19**	.28***
7. Animal-welfare advocacy	2.09 (0.80)	-	-	-	-	-	-	.21**
8. Restriction of animal products	5.09 (1.41)	-	-	-	-	-	-	-

Note. All measurements assessed on 1-7 scales, with the exception of animal-welfare advocacy (1-6) and moral self-regard (1-9).

Table 6

Final Version of the 4N Scale: Unrotated factor loadings, means, and standard deviations from Study 5.

Scale Items	Loadings	*M* (SD)
Natural		
It is only natural to eat meat.	.858	5.04 (1.67)
It is unnatural to eat an all plant-based diet.	.787	3.86 (1.82)
Our human ancestors ate meat all the time.	.677	5.29 (1.64)
Human beings naturally crave meat.	.788	5.00 (1.91)
Necessary		
It is necessary to eat meat in order to be healthy.	.815	4.00 (1.91)
You cannot get all the protein, vitamins, and mineral you need on an all plant-based diet.	.716	4.05 (2.02)
Human beings need to eat meat.	.834	4.15 (1.91)
A healthy diet requires at least some meat.	.847	4.47 (1.93)
Normal		

Not eating meat is socially unacceptable.	.334	2.69 (1.62)
It is abnormal for humans not to eat meat.	.773	3.92 (1.73)
Most people I know eat meat.	.400	6.34 (0.88)
It is normal to eat meat.	.709	5.93 (1.33)
Nice		
Meat is delicious.	.670	6.04 (1.38)
Meat adds so much flavor to a meal it does not make sense to leave it out.	.847	4.74 (1.83)
The best tasting food is normally a meat based dish (e.g., steak, chicken breast, grilled fish).	.821	5.08 (1.80)
Meals without meat would just be bland and boring.	.832	4.24 (1.98)

Note. Level of agreement or disagreement rated on a 1-7 scale (1 = Strongly disagree; 7 = Strongly agree).

Table 7

Test-retest reliabilities (correlations) for each of the 4N subscales and the full scale.

	Time 1				
	Natural	Necessary	Normal	Nice	Full 4N Scale
Time 2	.86***	.89***	.71***	.92***	.93***

Note. *** $p < .001$. $N = 136$.

Table 8

Correlations between 4Ns and dietary measures from Study 5.

		Animal Products								Non-Animal Products			
4Ns	MCS	Beef	Pork	Lamb	Chicken	Fish	Seafood	Eggs	Dairy	Bread	Rice	Veg	Fruit
Natural	.77***	.37***	.14*	.06	.36***	.12	.08	.12	.14*	.05	-.01	-.07	.01
Necessary	.69***	.38***	.18**	.16*	.38***	.25***	.15*	.14*	.16*	.03	.10	-.09	.05
Normal	.69***	.41***	.21**	.12	.31***	.15*	.08	.12	.11	-.02	.00	-.04	.03
Nice	.88***	.41***	.23***	.04	.38***	.12	.07	.17**	.23***	.05	.01	-.03	.00
Full Scale	.85***	.44***	.21**	.10	.41***	.18**	.11	.16*	.18**	.04	.04	-.07	.03

Note. MCS = Meat Commitment Scale. * $p < .05$. ** $p < .01$. *** $p < .001$.

$N = 236$.

Figures and Captions

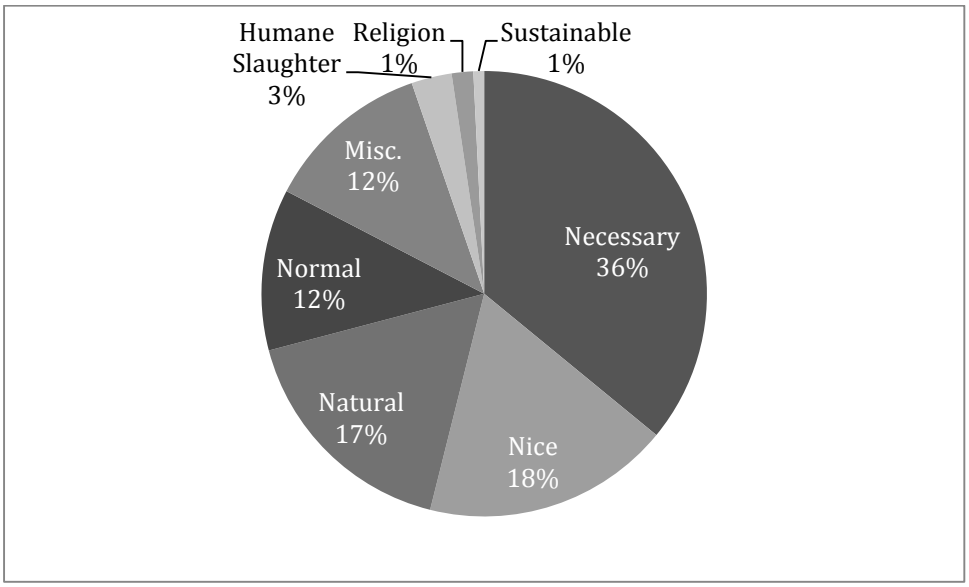

Figure 1. Frequency of various meat-eating justifications from Study 1a. $N = 176$ Penn undergraduate students.

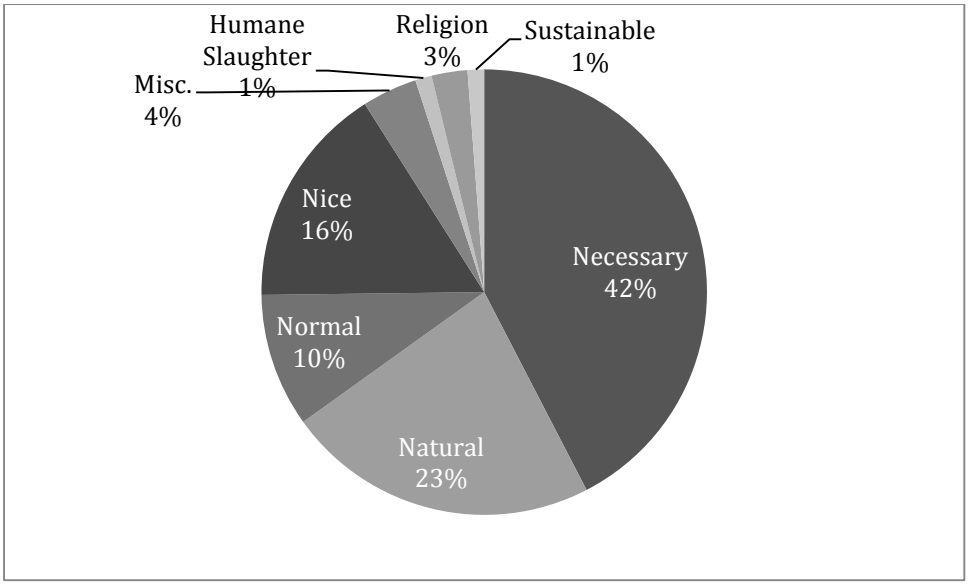

Figure 2. Frequency of various meat-eating justifications from Study 1b. $N = 107$ MTurk workers.

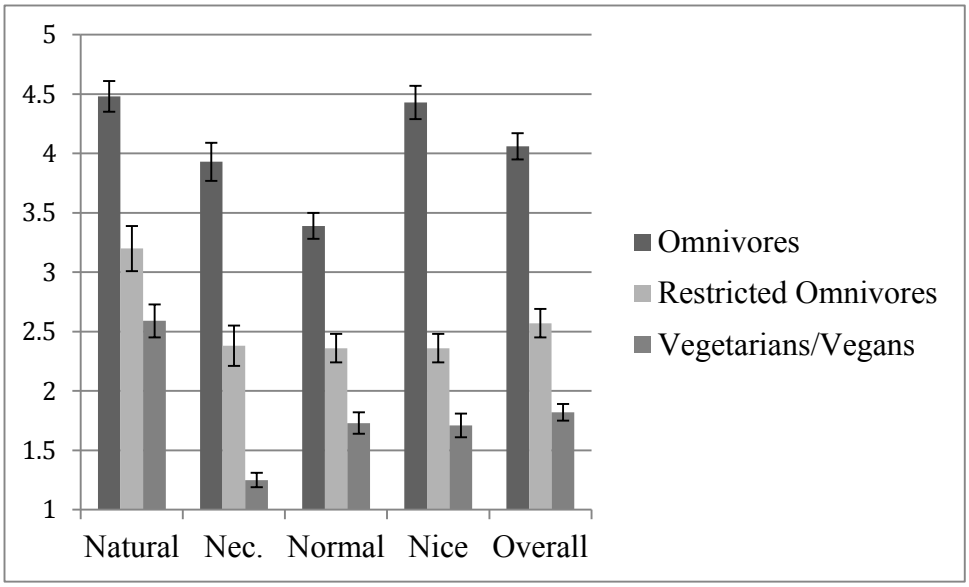

Figure 3. 4N endorsement means and standard errors by diet (Study 2). Bars ± 1 SE.

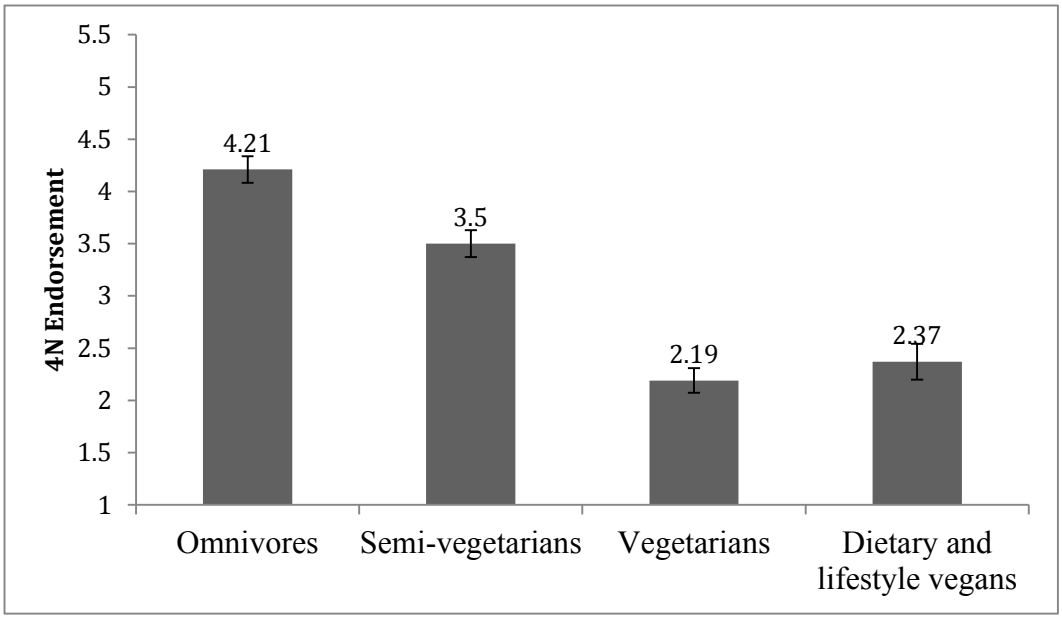

Figure 4. Mean 4N scores by diet (Study 3). Error bars ± 1 S.E.