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The 4Ns

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1	Running Head: THE 4NS
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3	Rationalizing Meat Consumption: The 4Ns
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30	Abstract
31	Recent theorizing suggests the 4Ns-that is, the belief that eating meat is
32	natural, normal, necessary, and nice-are common rationalizations people use to
33	defend their choice of eating meat. However, such theorizing has yet to be subjected
34	to empirical testing. Six studies were conducted on the 4Ns. Studies 1a-1b
35	demonstrated that the 4N classification captures the vast majority (83%-91%) of
36	justifications people naturally offer in defense of eating meat. In Study 2, individuals
37	who endorsed the 4Ns tended also to objectify (dementalize) animals and included
38	fewer animals in their circle of moral concern, and this was true independent of social
39	dominance orientation. Subsequent studies (Studies 3-5) showed that individuals who
40	endorsed the 4Ns tend not to be motivated by ethical concerns when making food
41	choices, are less involved in animal-welfare advocacy, less driven to restrict animal
42	products from their diet, less proud of their animal-product decisions, tend to endorse
43	Speciesist attitudes, tend to consume meat and animal products more frequently, and
44	are highly committed to eating meat. Furthermore, omnivores who strongly endorsed
45	the 4Ns tended to experience less guilt about their animal-product decisions,
46	highlighting the guilt-alleviating function of the 4Ns.
47	Keywords: meat, vegetarianism, rationalization, justification, animal welfare,
48	attitudes

Rationalizing Meat Consumption: The 4Ns

50 Introduction

51 Many omnivores are confronted by a "meat paradox" (Herzog, 2010; Joy, 52 2010; Loughnan, Bastian, & Haslam, 2014; Loughnan, Haslam, & Bastian, 2010). 53 They are morally conflicted by the thought of their behavior harming animals, while 54 also enjoying meat as a desirable staple in their diet. Loughnan et al. (2014) argue, 55 consistent with cognitive dissonance theory (Cooper, 2007; Festinger, 1957; Harmon-56 Jones & Mills, 1999), that resolution of this conflict can take one of two routes: one 57 can reject meat consumption, bringing one's behaviors into alignment with one's 58 moral ideals, or one can bring one's beliefs and attitudes in line with one's behavior 59 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) 60 61 suggests that the latter route is most commonly adopted.

62 Research attests that there are numerous strategies available to omnivores to 63 bring their beliefs and behavior in line, including denying that animals used as food 64 suffer (Bastian, Loughnan, Haslam, & Radke, 2012; Bratanova, Loughnan, & Bastian, 65 2011), or that such animals are worthy of moral concern (Loughnan et al., 2010). One 66 common, yet under-studied mechanism omnivores employ when resolving the meat 67 paradox is *rationalization*. Rationalization involves providing reasonable justifications for one's behavior when it comes under scrutiny or criticism, or when 68 69 one's behavior is perceived as discrepant with an integral aspect of one's character 70 (Kunda, 1990; Mercier, 2011; Tsang, 2002). Rationalizing potentially morally 71 troublesome behaviors has both social and personal benefits. Humans live in tight-72 knit social groups in which it is important to manage and defend one's actions to 73 others (Ingram, Piazza, & Bering, 2009). Providing defensible reasons and arguments

74

75 part of human sociality (Haidt, 2001; Mercier & Sperber, 2011). Rationalization is 76 also essential to maintaining a positive image of oneself as a good, moral person 77 (Bandura, 1999; Jordan & Monin, 2008; Mazar, Amir, & Ariely, 2008). Research 78 suggests that people often rationalize their behavior when they are motivated to 79 continue in a practice or belief that they might otherwise feel guilty about on account 80 of dissenting perspectives (Kundra, 1990; Haidt, 2001; Uhlmann, Pizarro, 81 Tannenbaum, & Ditto, 2009). While the ultimate goal of rationalization is to persuade 82 others of the legitimacy of one's perspective, rationalization functions best if the actor 83 is convinced by his or her own justifications (Tsang, 2002). One consequence of this 84 motivated reasoning process is that people will often seek out arguments that support 85 their own viewpoint, while overlooking or dismissing arguments that challenge it 86 (Ditto & Lopez, 1992; Kuhn, 1991; Nickerson, 1998). This leads people to 87 overestimate the amount of evidence that favors their position, known as "myside 88 bias" or belief overkill (see Baron, 1995; Perkins, 1985; Stanovich, West & Toplak, 2013).¹ 89

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.

94	poultry (Gallup, 2012; GfK Social Research, 2009; National Institute of Nutrition,
95	1997, 2001; Vegetarian Resource Group, 2012). Vegetarians often endorse a
96	multitude of reasons for rejecting meat or restricting meat from their diet, including
97	health, environment, and taste (see e.g., Berndsen & van der Pligt, 2004; Rozin,
98	Markwith, & Stoess, 1997), yet an increasingly common motivation involves moral
99	concerns about the cruel treatment of animals raised and slaughtered for food (Amato
100	& Partridge, 1989; Beardsworth & Keil, 1991; Fessler, Arguello, Mekdara, & Macias,
101	2003; Fox & Ward, 2008; Herzog, 2010; Jabs, Devine, & Sobal, 1998; Lindeman &
102	Väänänen, 2000; Ruby, 2012; Santos & Booth, 1996). Although meat eating is still
103	the norm in most countries, many people-including meat eaters themselves-believe
104	that vegetarianism is a morally admirable practice for which vegetarians deserve
105	credit (Minson & Monin, 2012; Ruby & Heine, 2011). For example, Ruby and Heine
106	(2011) found that, all else equal, individuals who reject meat are rated as more
107	virtuous than individuals who eat meat. This was true both among vegetarian and
108	omnivore participants, and when controlling for perceptions of the healthiness of the
109	vegetarian target's diet.
110	One consequence of this moral accreditation is that meat eaters sometimes

110 111 respond defensively to the presence of vegetarians. This may be because vegetarian 112 appeals and campaigns sometimes come across as self-righteous, and thus off-putting. 113 Additionally, it may be that the moral commitments of vegetarians pose an implicit 114 threat to meat eaters' own moral identities. If some individuals refrain from eating 115 animals out of concern for animal welfare, this raises the question of whether others 116 should do likewise, in effect, "If we can do it, why don't you?" (see Minson & Monin, 117 2012). Thus, omnivores today sometimes find themselves in social situations where they must defend their commitments to eating meat. 118

119 The 3Ns of Justification

120 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 121 and diffuse any guilt they might otherwise experience as a consequence of consuming 122 123 animal products. These justifications include that eating meat is *natural*, *normal*, and 124 necessary, otherwise known as the "Three Ns of Justification" (see Joy, 2010, pp. 96-125 97). Joy argues that through a recurrent process of socialization people come to 126 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 127 128 *normal*—that it is what most people in civilized society do and what most people 129 expect from us; and that eating meat is *necessary*—that we need meat for survival or 130 that we need to consume at least some meat to be strong, fully healthy individuals. 131 Joy proposes that the 3Ns are widespread beliefs that are reinforced through various 132 social channels, including family, media, religion, and various private and public 133 organizations. For example, one popular belief related to the *necessity* of eating meat 134 is the idea that one cannot maintain a diet that contains enough protein without 135 consuming at least some meat. Although scientists, including the American Dietetic 136 Association (ADA), America's leading organization of nutritionists, have released 137 numerous publications showing that this is not the case (see e.g., ADA, 2009; Rand, 138 Pellett, & Young, 2003; Young & Pellett, 1994), the belief is persistent. 139 The application of the 3Ns is not limited to meat eating. The 3Ns may be a 140 ubiquitous set of rationalizations that have an even broader application. Many 141 historical practices, from slavery to sexism, have invoked the 3Ns as justification. For 142 example, in defense of male-only voting practices in the U.S. opponents of women's 143 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" (Joy, 2010, p. 97; see footnote for a contemporary example).² Today, most people 146 147 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.

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

173 For these reasons, we submit *niceness* as a fourth N (justification) used in 174 defense of eating meat, closing out the 4Ns at *natural*, *normal*, *necessary*, and *nice*. 175 We speculate that *nice* has largely been ignored by theorists as a potential justification 176 category because it constitutes a very weak moral defense. This becomes apparent 177 when it's applied to less controversial ideologies, such as sexism. Imagine someone 178 making the argument that men should continue to be granted favor in society simply 179 because men derive pleasure from their elevated position. Few people would find 180 such an argument defensible, as it prioritizes the relatively trivial pleasure of some 181 (men) over the much deeper suffering of others (women). Yet this argument is 182 analogous to the one employed in defense of eating meat on account of the pleasure humans derive from it.³ 183 184 In the present research, we tested whether the 4Ns are in fact the principal 185 justifications omnivores offer in defense of their commitment to eating meat. In 186 Studies 1a and 1b, we tested this very simply by having omnivores provide three 187 reasons why they think it is acceptable to eat meat, and we coded their responses via 188 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.

194

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.

200 Study 1a

201 Participants, materials, and procedures. We recruited 188 students from the 202 University of Pennsylvania to participate in exchange for course credit. The study was 203 embedded in a larger package of studies with non-overlapping themes. In response to 204 a filter question, "Do you ever eat meat, for example, beef, pork/ham, chicken, turkey, 205 fish or other kinds of seafood?" twelve participants (6%) reported that they never eat 206 meat. The remaining 176 meat-eating participants (114 women, 62 men; $M_{age} = 19.66$, 207 SD = 2.07) continued with the meat-eating justification question, while the twelve 208 non-meat-eaters skipped this question. Participants were instructed: "Please give 209 three reasons why you think it is OK to eat meat," and were provided three separate 210 textboxes to type in their three reasons. Among the sample of 176 meat eaters, 91% 211 reported being "omnivores", 6% "semi-vegetarians", and 3% "pescetarians" (fish or 212 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

215	Coding of justifications. Two participants offered only two justifications,
216	while all others offered three, producing a grand total of 526 responses. Three of the
217	authors [JP, MBR, SL] each read the entirety of responses given and together they
218	devised a coding scheme to fully capture the range of responses offered (see Table 1
219	for coding scheme and examples for each category). Next, two of the authors [JP,
220	MBR] separately coded a different half of the responses using the coding scheme, and
221	a third person, an English-speaking undergraduate student, blind to the objectives of
222	the study, independently coded all of the responses. Interrater agreement was high
223	between both sets of coders. There were 236 agreements out of 264 between the
224	independent coder and JP (89.4% agreement rate). There were 250 agreements out of
225	262 between the independent coder and MR (95.4% agreement). Disagreements
226	between the raters were resolved via joint discussion sessions. Twelve responses were
227	determined to be unscorable, leaving a final total of 514 scored responses.
228	[Insert Table 1 about here]
229	Results
230	Figure 1 presents the frequency of each response category. The 4Ns accounted
231	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").

233	percent of miscellaneous justifications in this sample, but the percent of
234	miscellaneous justifications never exceeded the percent obtained for each of the 4Ns.
235	[Insert Figure 1 about here]
236	In sum, the 4Ns made up the bulk of justifications spontaneously offered by
237	omnivores in defense of eating meat. In Study 1b, we sought to replicate this finding
238	using a different, non-student sample.
239	Study 1b
240	We recruited 107 adults (49 women, 57 men; $M_{age} = 34.90$, SD = 12.15) using
241	Amazon's Mechanical Turk (www.mturk.com). All participants were located in the
242	U.S. and paid for their participation. Although we did not assess participants' diet in
243	this study, rates of non-omnivores (strict vegetarians and vegans) among MTurk
244	workers tend to reflect levels on par with the overall population (1-5%; see Studies 3-
245	5). The phrasing of the meat justification probe was the same as in Study 1a (i.e.,
246	"Please give three reasons why you think it is OK to eat meat"). A total of 321
247	responses were collected. Two independent raters (undergraduate students; one blind
248	to the hypotheses) coded the responses and agreed in their classification 95.7% of the
249	time. Disagreements were resolved between the two raters through discussion.
250	As can be seen in Figure 2, the category frequencies were quite consistent
251	with the results from Study 1a. The 4Ns accounted for 91% of the total justifications
252	offered. As in Study 1a, Necessary was the most frequent justification category.
253	Necessary was followed by Natural, Nice, and Normal, respectively. Thus, the results
254	largely replicated Study 1a, yet with an even larger representation of the 4Ns offered
255	as justifications for eating meat.
256	[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.

262

Study 2 – The 4Ns and Moral Concern for Animals

263 Study 2 had four objectives. First, we developed a scale for assessing 4N 264 endorsement as a continuous variable. Second, we sought to show that individuals 265 with dietary restrictions regarding meat would endorse the 4Ns to a lesser extent than 266 individuals without these restrictions. Third, we tested whether our newly developed 267 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 268 269 mental capacities to animals. Increasing evidence suggests that meat eaters *objectify* 270 or de-mentalize animals (i.e., deny that animals have mental properties, such as the 271 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., 272 273 2012; Bratanova et al., 2011; Loughnan et al., 2010). For example, in one study 274 (Loughnan et al., 2010), participants were randomly assigned to consume either beef 275 jerky or nuts, and, subsequently, to rate a cow's capacity to suffer. Participants who 276 ate beef rated cows as less capable of suffering than participants who ate nuts, 277 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 278 279 to de-mentalize animals also tend to rationalize their meat eating. 280 As a final objective, we sought to show that endorsement of the 4Ns is greater 281 among individuals who tend to endorse anti-egalitarian values and support

282 hierarchical group-based systems of inequality (Pratto, Sidanius, Stallworth, & Malle, 283 1994). Some previous research by Allen, Wilson, Ng, and Dunne (2000) suggests that 284 individuals on the higher end of the vegetarian-omnivore continuum (i.e., those who 285 consume higher quantities of meat) tend to be more supportive of inequality in group 286 relationships than individuals on the lower end. In particular, they found modest 287 correlations between omnivore identification and both right-wing authoritarianism 288 (Alternever, 1981) and social dominance orientation (SDO; Pratto et al., 1994). 289 Individuals high in SDO are motivated to see their own groups dominate other 290 groups. Arguably, motivations to defend meat consumption may share a common 291 origin with motivations for group-based inequality (i.e., between humans and 292 animals). Thus, we expected 4N endorsement to correlate positively with SDO. However, we also expected 4N endorsement to have explanatory power that extends 293 294 beyond any relationship it has with SDO, as we expect omnivores low in SDO to also 295 engage in meat-consumption rationalization. Consistent with such a hypothesis, we 296 predicted that 4N endorsement would *negatively* predict mentalizing (attributing 297 mental states to animals) and moral regard for animals, independent of SDO. 298 Method

299 Participants and dietary classification. Participants were 171 students from 300 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. 301 302 Participation was voluntary. Diet was assessed on a continuum rather than as a 303 dichotomous choice (for similar approaches, see Allen et al., 2000; Hamilton, 2006; 304 Rozin et al., 2012). Participants reported one of seven diets ranging from strong 305 identification with meat eating (meat-eater, or omnivore) to restricted omnivore 306 (limited meat intake, e.g., only fish or chicken, no red meat) to strong identification

307	with meat abstinence (lacto-ovo vegetarian, or vegan). Based on their self-reported
308	diet, participants were divided into three groups (73 omnivores; 40 restricted
309	omnivores; 58 vegetarians and vegans).
310	Measures.
311	4N Scale. Sixteen items, four items per N, were generated by three of the
312	authors [JP, SL, HMW], taking inspiration partly from Joy's (2010) discussion of the
313	3Ns of Justification. The four resulting subscales with their corresponding items and
314	Cronbach's αs were as follows:
315	• Natural ("It is only natural to eat meat", "Our human ancestors ate meat all
316	the time", "It is unnatural to eat an all plant-based diet", "Human beings are
317	natural meat-eaters – we naturally crave meat"; $\alpha = .78$)
318	• Necessary ("It is necessary to eat meat in order to be healthy", "A healthy diet
319	requires at least some meat", "You cannot get all the protein, vitamins and
320	minerals you need on an all plant-based diet", "Human beings need to eat
321	meat"; $\alpha = .87$)
322	• Normal ("It is normal to eat meat", "It is abnormal for humans not to eat
323	meat", "Most people eat meat, and most people can't be wrong", "It is
324	common for people to eat meat in our society, so not eating meat is socially
325	offensive"; $\alpha = .65$)
326	• Nice ("Meat is delicious", "Meat adds so much flavor to a meal it does not
327	make sense to leave it out", "The best tasting food is normally a meat-based
328	dish (e.g., steak, chicken breast, grilled fish)", "Meals without meat would just
329	be bland and boring"; $\alpha = .84$).
330	

331 The overall scale had a strong internal reliability ($\alpha = .93$). Participants rated their 332 level of agreement or disagreement with each item on a 1-7 scale (1 = completely333 *disagree*; 4 = neither agree nor disagree; <math>7 = completely agree).

334 Moral concern for animals and mind attribution. To examine whether these 335 dietary groups can be distinguished on the basis of how they think about animals, we 336 measured moral concern and mind attribution. To measure moral concern, we adapted 337 the "moral circle" measure from Laham (2009) (see also Bratanova, Loughnan, & 338 Gatersleben, 2012; Loughnan et al., 2010). Participants were presented with a list of 339 26 animals prefaced with the instruction: "When we think about entities in the world, 340 we might feel a moral obligation to show concern for the welfare and interests of 341 some of those entities. Below is a list of entities. Circle those that you feel morally 342 obligated to show concern for." We used the number of animals circled divided by the 343 total number of possible animals as their moral concern score, with higher scores 344 indicating larger moral circles. To assess mind attribution, or more precisely the 345 extent to which people *deny* mental states to food animals, participants were asked to 346 imagine a cow (beef is the most commonly consumed meat in Australia; Australian 347 Bureau of Statistics, 2013) and to rate the extent to which they believe the cow 348 possessed 20 mental capabilities on a Likert scale (1 = definitely does not possess; 7 = 349 definitely does possess). The scale comprises two dimensions previously identified to 350 capture the way people think about minds (see Gray, Gray, & Wegner, 2007): agency 351 (8 items; e.g., *planning*, *self-control*) and experience (12 items; e.g., *joy*, *hunger*). All 352 20 items were averaged as our measure of mind attribution. The overall reliability of 353 the scale was good ($\alpha = .89$).

354 Social dominance orientation. Previous work has identified endorsement of
 355 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 ($\alpha = .91$; 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 questionnaire⁵, 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.

367 **Results**

368 Correlations between the 4N scale and other measures can be seen in Table 2. 369 Skewness was an issue particularly for the moral concern and mind attribution 370 measures, due to significant differences in responding as a function of diet. Thus, to 371 reduce Skewness we log transformed scores for these measures prior to calculating 372 Pearson's correlations. The data contained small amounts of missing data where 373 participants did not complete all measures, and this is reflected in the variable degrees 374 of freedom across the analyses. 375 [Insert Table 2 about here] 376 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 377

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.

379	their diet. Consistent with this prediction, omnivores endorsed the 4Ns at a
380	significantly higher rate ($M = 4.06$, SD = 0.96) than both restricted omnivores ($M =$
381	2.58, SD = 0.77) and vegetarians/vegans ($M = 1.82$, SD = 0.56), and restricted
382	omnivores endorsed the 4Ns significantly more than vegetarians/vegans, $p < .001$ for
383	all comparisons (Tukey's HSD). Consistent with a belief-overkill effect or myside
384	bias, these diet-based differences held across all four subscales, $Fs > 59.40$, $ps < .001$,
385	η^2_p = .354594; <i>p</i> s < .03 for all groupwise comparisons (see Figure 3).
386	A few further observations are worth noting. First, of all the Ns, Natural had
387	the highest endorsement ratings among individuals with meat-restricted diets. Second,
388	Normal had the lowest level of endorsement among omnivores. Finally, Nice
389	produced the largest drop in endorsement ratings when comparing omnivores with
390	restricted omnivores and vegetarians/vegans.
391	[Insert Figure 3 about here]
392	Moral concern. Diet had an overall effect on moral concern for animals.
	······································
393	$F(1,156) = 33.52, p < .001, \eta^2_p = .302$. As expected, omnivores included fewer
393 394	$F(1,156) = 33.52, p < .001, \eta^2_p = .302$. As expected, omnivores included fewer animals in their circle of moral concern ($M = .52$, SD = .32), as compared to both
393 394 395	$F(1,156) = 33.52, p < .001, \eta^2_p = .302$. 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),
393 394 395 396	$F(1,156) = 33.52, p < .001, \eta^2_p = .302$. 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
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 393 394 395 396 397 398 399 400 401 402 	$F(1,156) = 33.52, p < .001, \eta^2_p = .302.$ 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,

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

406 **SDO.** There was an overall effect of diet on system justification 407 endorsement as measured via SDO, F(2,168) = 27.09, p < .001, $\eta^2_p = .244$. As 408 expected, omnivores were more likely to endorse exploitative ideologies (M = 2.87, 409 SD = 0.98) than were restricted omnivores (M = 2.01, SD = 0.70) and 410 vegetarians/vegans (M = 1.87, SD = 0.70), Tukey's HSD, ps < .001, who in turn did

411 not differ in SDO, p = .70.

412 **Regression analysis.** To examine whether 4N endorsement predicted moral 413 concern for animals and mind attribution to animals independent of SDO, we entered 414 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 415 416 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 417 418 attributing less mind to animals, $\beta = -.26$, t(168) = -3.38, p = .001, as did SDO, $\beta = -.26$ 419 $.31, t(156) = -3.99, p < .001, and \beta = -.30, t(168) = -3.86, p < .001$ (respectively). 420 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 421 422 endorsement predicted moral concern for fewer animals and less mentalizing, 423 independent of SDO, though 4N endorsement correlated with SDO. Thus, 4N meat 424 justification appears to be related to inequality justification, but it has predictive value 425 beyond this relationship.

426

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

427 The main aim of Study 3 was to explore the relationship between the 4N428 scale with another recently developed measure of psychological defenses meat

429	eaters engage in-Rothgerber's (2013) Meat-Eating Justification (MEJ) scale. The
430	MEJ assesses a number of different psychological strategies, including both direct
431	and indirect strategies. Within Rothgerber's theorizing, direct strategies include
432	denying that animals suffer when being raised and killed for meat, a process related
433	to objectification, discussed in Study 2 (e.g., "Animals do not feel pain the same
434	way humans do"); general pro-meat appeals (e.g., "I enjoy eating meat too much to
435	ever give it up"); and explicit endorsements of various justifications for eating meat
436	including religious justifications (e.g., "God intended for us to eat animals"), health
437	justifications (e.g., "Meat is essential for strong muscles"), hierarchical
438	justifications (e.g., "Humans are at the top of the food chain and meant to eat
439	animals"), and fate or destiny justifications (e.g., "Our early ancestors ate meat, and
440	we are supposed to also"). From our perspective, many of these justification
441	categories are encompassed by several of the 4N categories, specifically, Natural
442	(hierarchy, fate, religion ⁶) and Necessary (health), and the <i>pro-meat</i> subscale is
443	quite similar to Nice. Thus, it would be surprising if the 4N scale did not correlate
444	highly with the MEJ-Direct strategies. At the same time, the MEJ also assesses two
445	indirect strategies available to meat eaters, which includes avoiding thoughts of
446	animal suffering (e.g., "I try not to think about what goes on in slaughterhouses"),
447	and dissociating meat from its origins (e.g., "I do not like to think about where the
448	meat I eat comes from"). Given that the 4N scale is a measure of meat-eating
449	rationalizations, and thus has less in common with these indirect strategies, we
450	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.

451 subscale, though we anticipated that its relationship with this subscale would be452 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.

459 Method

460 Participants and diet. We recruited a new sample of 195 adults via 461 Mechanical Turk. All participants were located in the U.S. and were compensated 462 for their participation. Three participants did not complete the survey, leaving a total 463 of 192 (100 women, 83 men, 5 other or missing; $M_{age} = 35.74$, SD = 13.02). The 464 majority of the sample identified as "omnivores/non-vegetarians" (86%), 9% as 465 "partial vegetarians," and 5% as "other" (e.g., pescetarian). Nine additional participants were recruited that identified as vegetarian or vegan, but due to 466 467 experimenter error they did not receive the full battery of materials (specifically, 468 they did not receive the MEJ scale), and thus were not included in the analyses 469 reported here (exceptions are footnoted). 470 Materials and procedures. In the following set order, participants

471 answered several subscales of the Food Choice Questionnaire (FCQ: Health,

472 Familiarity, Sensory appeal, Natural content, and Weight control; only the three-

473 highest loading items from each subscale were administered, 15 items total; see

474 Steptoe, Pollard, & Wardle, 1995), the Animal Welfare and Environmental

475 Protection subscales of the Ethical Food Choice Questionnaire (5 items total;

& Ward

476 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 477 Normal item was reworded; for subscale reliabilities see footnote).⁷ In this study, 478 479 the 4N scale had a strong internal reliability (Cronbach's $\alpha = .94$). 480 The FCQ presents participants with a number of statements that finish the 481 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 482 483 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 484 experienced pain"; "...has been prepared in an environmentally friendly way"). 485 486 The scale ranged from 1 = *Not at all important* to 4 = *Very important*. 487 The MEJ (Rothgerber, 2013) contains nine first-order subscales (pro-meat, 488 deny, dichotomize, fate, religion, health, hierarchy, dissociation, avoid) that can be 489 further divided into two second-order subscales (Direct vs. Indirect strategies). Each 490 first-order subscale contains three items. The *dichotomize* subscale, which was not 491 discussed above, is a first-order MEJ subscale designed to assess the process of 492 dichotomizing (or splitting) animals into different categories, such as "pets" vs. 493 "food animals." As reported by Rothgerber (2013), the dichotomize subscale 494 generally produces the lowest internal reliabilities (α s ranged from .53 to .55), and 495 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.

496 indirect items. Thus, we treated dichotomize as a direct factor. In previous studies, 497 Rothgerber (2013) found that men tend to endorse the MEJ-Direct strategies more 498 so than women, while women tend to adopt the indirect strategies more so than men 499 (the exception being *dichotomize*, which did not differ by gender). It was also found 500 that many of the direct strategies correlated positively with meat consumption (i.e., 501 they functioned successfully as meat-eating defenses), while the indirect strategies 502 often correlated negatively with meat consumption (i.e., they were counter-503 productive as meat-eating defenses). Rothgerber did not report factor analyses of the 504 MEJ items. Nonetheless, in our sample, the 27 MEJ items factor loaded onto three 505 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 506 507 (including dichotomize items), and the second factor was comprised of all the 508 indirect items. The third factor was comprised of the three religious justification 509 items, which cross-loaded with the first factor. Since all of the religious items 510 loaded more strongly with the first factor than the third factor, we dropped the third 511 factor and aggregated the religious items with the other direct items-which is 512 consistent with Rothgerber's theorizing. 513 We assessed MEJ in terms of participants' level of agreement or 514 disagreement with the items on a -4 (Strongly disagree) to 4 (Strongly agree) scale 515 (with 0 = *Neither agree nor disagree*). The same 9-point bipolar scale was used for 516 the 4N scale. Basic demographic information (gender, age, socio-economic status [SES] relative to other Americans) was also collected. 517

518 **Results**

519 **Preliminary analysis.** Repeated-measures t-tests between the subscales 520 revealed that Nice (M = 1.23, SD = 1.89) was endorsed to a greater extent than were

521	the other Ns (all $ps < .001$), followed by Natural ($M = 0.85$, SD = 1.68). Participants
522	endorsed that eating meat is Necessary ($M = 0.34$, SD = 2.23) and Normal ($M =$
523	0.13, SD = 1.68) at equal levels ($p = .091$), yet lower than endorsement levels for
524	Nice and Natural ($ps < .001$).
525	Overall, men endorsed the 4Ns more strongly ($M = 6.02$, SD = 1.45) than
526	did women ($M = 5.36$, SD = 1.70), $F(1, 182) = 8.01$, $p = .005$, $\eta^2_p = .042$ (we
527	excluded "other gender" participants from the analysis of gender). Respectively,
528	men endorsed Normal ($M = 5.52$, SD = 1.60 vs. $M = 4.80$, SD = 1.70) and Nice (M
529	= 6.79, SD = 1.66 vs. M = 5.84, SD = 1.91) more than women, $Fs > 8.77$, $ps < .004$,
530	η^2_p = .046066, but did not differ from women in their endorsement of Natural or
531	Necessary, $Fs < 3.24$, $ps > .07$, $\eta^2_p = .015017$. Consistent with Rothgerber's
532	(2013) findings, overall men scored higher on the MEJ than women ($M = 5.38$, SD
533	= 1.26), $F(1, 182) = 6.88$, $p = .009$, $\eta^2_p = .036$, but this was due to men engaging in
534	more direct strategies ($M = 5.91$, SD = 1.20) than women ($M = 5.09$, SD = 1.52),
535	$F(1, 182) = 15.99, p < .001, \eta^2_p = .081$. By contrast, women engaged in more
536	indirect strategies ($M = 6.40$, SD = 1.66) than men ($M = 5.61$, SD = 1.96), $F(1, 182)$
537	= 8.94, $p = .003$, $\eta^2_p = .047$. Neither the 4N scale nor the MEJ scale correlated
538	significantly with participants' age or SES ($rs < .08, ps > .29$).
539	The 4N scale correlated moderately to highly with all seven of the MEJ-
540	Direct subscales, but it did not correlate with either of the MEJ-Indirect subscales
541	(see Table 3). The 4N Scale correlated at $r = .84$ with the overall MEJ-Direct scale,
542	and $r =04$ with the MEJ-Indirect scale. This makes sense theoretically, as the
543	indirect strategies of dissociating or avoiding thoughts of animal suffering are
544	passive responses, whereas the direct strategies involve many explicit
545	rationalizations, much like the 4Ns. It is not surprising then that the MEJ-Pro-meat,

549	[Insert Table 3 about here]
550	Food choice motivations. Table 4 depicts the correlations between the 4N
551	scale and the various food-choice motivations, and the same for the MEJ scale.
552	With regards to non-ethical motivations, people who selected food on the basis of
553	its familiarity were more inclined to endorse the 4Ns. With regards to ethical
554	motivations, as predicted, individuals who were concerned about the environment,
555	and to a lesser extent animal welfare, were less inclined to endorse the 4Ns. ⁸ The
556	MEJ behaved very similarly to the 4N scale, with the addition that the MEJ
557	correlated negatively with natural content motivations as well (see Table 4).
558	[Insert Table 4 about here]
559	In sum, men endorsed the 4Ns to a greater extent than did women. The 4N
560	scale correlated with other types of meat-eating justifications and defenses, as
561	measured by the MEJ-Direct subscale, but endorsement of the 4Ns was unrelated to
562	dissociation and avoidance meat-eating strategies. Additionally, individuals who
563	endorsed the 4Ns were motivated to make food choices on the basis of the familiarity
564	of the food, while individuals who rejected the 4Ns were motivated to select foods
565	that promote animal and ecological welfare. Similar results were obtained for the
566	MEJ-Direct subscale. Although the two scales have some overlapping components,
567	we believe the 4N scale has several distinct methodological strengths, which we
568	discuss at length in the General Discussion.

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.

569	Study 4 – The 4Ns, Animals-Product Choices, Moral Emotions and Self-
570	Appraisals
571	Studies 2-3 provided some initial evidence that individuals who reject the 4Ns
572	tend to have more meat-restricted diets (Study 2), are more concerned with the
573	welfare of animals (Study 2), and are motivated by ethical concerns when making
574	food choices (Study 3). The aim of Study 4 was to demonstrate in a more
575	comprehensive manner the role of 4N endorsement in people's dietary and lifestyle
576	practices involving animal products, as well as the self-directed emotions (e.g., guilt,
577	pride) and appraisals generated from these practices. We also sought to correlate 4N
578	endorsement with a person's level of involvement in animal-welfare advocacy and
579	their endorsement of Speciesist attitudes (i.e., prioritizing human interests above
580	animal interests; see e.g., Singer, 2009). To this end, we recruited a more
581	heterogeneous sample that included full vegetarians and vegans, in addition to
582	omnivores and semi-vegetarians who were concerned to some degree about their
583	consumption of animal products.
584	We predicted that 4N endorsement would be <i>negatively</i> related to (a) taking
585	active steps towards restricting one's use and consumption of animal products, (b)
586	animal-welfare advocacy, and (c) experiencing pride and appraisals of moral self-
587	regard in relation to one's animal-product consumption. By contrast, we predicted that
588	4N endorsement would be <i>positively</i> related to (d) the endorsement of Speciesist
589	attitudes towards animals. With regards to guilt experienced due to one's
590	consumption of animal products, we were uncertain how 4N endorsement would
591	relate to this variable. If Joy (2010) is correct that meat-eating justifications serve to
592	"alleviate the moral discomfort we might otherwise feel when eating meat" (p. 97),
593	then we might expect a <i>negative</i> relationship between guilt and 4N endorsement. But

597 Method

598 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 599 600 suitable payment. Participants were recruited online via Mechanical Turk. 601 Recruitment materials described the study as "a series of questions about your 602 consumption/use of animal products, particularly concerns you may have about 603 restricting or not restricting various animal products." A pre-screening questionnaire 604 filtered out potential participants who consumed all kinds of meat and other animal 605 products and who had no concerns about doing so. The aim was to recruit only 606 individuals who had some misgivings or ambivalence about consuming animal 607 products. The participant pool included only those who rejected at least one type of 608 animal-based food product, or omnivores who were considering restricting their 609 consumption of animal products though currently not refraining from animal-610 product consumption.

611 There were two waves of recruitment. Both waves were conducted through 612 Mechanical Turk. In the initial wave, 182 participants completed the survey. A 613 second wave was deemed necessary to increase the number of vegetarians and 614 vegans collected. In the second wave, conducted a week after the first, a pre-615 screening questionnaire filtered out participants who identified as omnivores or 616 semi-vegetarians. An additional 33 vegetarian and vegan participants completed the 617 survey in the second wave. The final sample consisted of 57 participants who selfidentified as omnivores, 90 as semi- or partial vegetarians, 44 as vegetarians, 16 as 618 619 strict vegetarians/dietary vegans, and 8 as lifestyle vegans.

620	Materials and procedures.
621	Current diet. For the purpose of the survey, participants were instructed that
622	"animal products" refers to anything that comes from an animal, including meat,
623	dairy, eggs, honey, leather, fibers (wool, silk, etc.), and animal-derived ingredients
624	that are used in a variety of products, such as toiletries. Participants indicated their
625	current dietary practices with respect to animal products by selecting one diet from
626	a list of five: "Omnivorous," "Semi- or Partial Vegetarian," "Vegetarian," "Strict
627	Vegetarian or Dietary Vegan," or "Lifestyle Vegan" (definitions for each category
628	were provided, see Appendix A). Participants also indicated which animal products
629	they currently rejected (i.e., "do not consume or use") from a list of thirteen.9
630	4N scale. The 16-item 4N scale from Study 2 was used to assess 4N
631	endorsement. Each statement was presented in a randomized order and assessed in
632	terms of level of agreement on a seven-point scale (1 = <i>Strongly disagree</i> ; 7 =
633	Strongly agree). Overall, the sixteen items of the 4N scale had a high internal
634	reliability ($\alpha = .94$). ¹⁰ The overall mean for the scale (see Table 6) was lower than
635	in previous studies, most likely due to the greater sampling of vegetarians and
636	vegans, and the omission of omnivores who have absolutely no concern about
637	consuming animal products.
638	Restriction of animal products. We assessed the degree to which

Restriction of animal products. We assessed the degree to which

639 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 $\alpha = .80$; Nice $\alpha = .89$; Necessary $\alpha = .92$), with the exception of Normal, which had a below satisfactory internal reliability ($\alpha = .63$). In the final study, we aimed to improve upon several of the Normal subscale items.

640 product restrictions they were engaging in within the past five years, with a single 641 question: "How would you describe the general direction of your changes with 642 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 = 643 644 *Fluctuating between restricting and not restricting*; 7 = *Strongly moving towards* 645 *more restrictions*), with higher scores representing movement towards greater 646 restriction. Only participants who indicated that they had changed their diets in the 647 past five years answered this question. Participants who indicated they had not 648 changed their diet in the past five years were assigned a score of 4 (thus, a score of 649 4 represented either no change or fluctuation between restricting and not restricting 650 animal products).

651 *Pride, guilt, discomfort, and moral self-regard.* We included four measures 652 of people's emotional and self-appraisal correlates related to their consumption and 653 use of animal products. These reflected self-conscious moral emotions (guilt, pride) 654 and moral self-appraisals participants might experience with regards to these dietary 655 and lifestyle choices. Participants indicated how proud, guilty, and uncomfortable 656 they felt with regard to their current animal-product decisions, on a 1-7 scale (e.g., 1 657 = Not at all proud; 7 = Extremely proud). Additionally, they rated on a nine-point 658 scale how accurately a series of six moral-character traits described them in relation 659 to their animal-product decisions: inconsistent, principled, reliable, committed, 660 *dedicated*, and *hypocritical*. The overall reliability of the scale was high ($\alpha = .90$), 661 thus, the six traits were aggregated to form a moral self-regard index (inconsistent 662 and hypocritical were reverse scored). See Table 6 for descriptive statistics and 663 correlations pertaining to these four measures.

664 Animal-welfare advocacy. We included three measures of animal-welfare 665 advocacy, measured on six-point scales. These items encompassed tendencies to 666 experience negative affect when witnessing animal-welfare violations or attempts to influence others' animal-product consumption. Participants were asked how often 667 668 they tried to convince others to limit or reject some or all animal products (1 =669 *Never*: 6 = All of the time); how upset they are when eating with others who are 670 consuming animal products that they reject (1 = Not at all upset; 6 = Extremely671 *upset*); and how angry they are when they see someone wearing a fur coat (1 = Not)672 at all angry; 6 = Extremely angry). The three items were fairly well inter-correlated 673 (rs ranged from .39 to .53; $\alpha = .62$), thus, we aggregated them into a single *animal*-674 *welfare advocacy* index.

675 *Speciesism.* Speciesist attitudes (prioritizing human interests over animal 676 interests) were measured with five items (see Appendix B). Agreement with the 677 items was measured on a 1-7 scale ($1 = Strongly \, disagree; 7 = Strongly \, agree$), with 678 higher values representing greater endorsement of Speciesism. The five items were 679 internally reliable (Cronbach's $\alpha = .84$), thus, they were aggregated to form an 680 index of Speciesism endorsement. Descriptive statistics for the index may be found 681 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

689	alternative to traditional meat products, qualitative self-evaluations of any
690	inconsistencies in their dietary behavior, and an assessment of meaning in life (the
691	4N scale was unrelated to this measure). For brevity's sake, we do not report on
692	these measures. Please contact the authors for more information.
693	[Insert Table 5 about here]
694	Results
695	Diet and 4Ns. Figure 4 depicts the mean 4N scale scores (and standard
696	errors) by diet. Diet had a large, overall effect on 4N endorsement, $F(1,211) =$
697	38.76, $p < .001$, $\eta^2_p = .36$. As we predicted, omnivores had the highest 4N scores,
698	followed by semi-vegetarians (see Figure 4). Vegetarians and dietary and lifestyle
699	vegans had the lowest 4N scores. All post hoc comparisons (Tukey HSD tests) were
700	significant at $p < .001$, except the comparison of vegetarians and dietary/lifestyle
701	vegans, which did not at all differ, $p = .906$.
702	[Insert Figure 4 about here]
703	Correlates of the 4Ns. Table 5 presents correlations between the overall 4N
704	scale, Speciesism endorsement, the emotion and self-appraisal measures pertaining
705	to participants' consumption/use of animal products, animal-welfare advocacy, and
706	animal product restriction. As expected, the 4N scale was negatively correlated with
707	animal-welfare advocacy and animal product restriction. In other words, individuals
708	who endorsed the 4Ns were less involved in animal-welfare advocacy and were less
709	likely to be moving towards more restrictions with regards to animal product
710	consumption. Also as predicted, the 4N scale was positively correlated with
711	Speciesism. That is, individuals who endorsed the 4Ns tended to hold Speciesist
712	beliefs. Critically, the relationship was moderate in strength, which suggests that 4N
713	endorsement is a distinct construct from Speciesism. Additionally, the 4N scale was

714 negatively correlated with pride in one's animal-product decisions, and negatively 715 correlated with moral self-regard derived from such decisions. That is, people who 716 endorsed the 4Ns experienced less pride and less moral self-regard with respect to 717 their animal-product decisions. With all dietary groups included in the analysis, 4N 718 endorsement was uncorrelated with guilt and discomfort over one's animal-product 719 decisions. However, when restricting the sample to just omnivores, 4N endorsement 720 was *negatively* correlated with guilt experienced in relation to one's diet, r(55) = -721 .40, p = .002, though the negative relationship was not significant for discomfort, 722 r(55) = -.16, p = .246. Thus, omnivores who strongly endorsed the 4Ns experienced 723 less guilt about their dietary practices than did omnivores who endorsed them to a 724 lesser degree.

It is worth noting that the 4N scale correlated more strongly than did the 725 726 Speciesism scale with all of the outcome measures, with the exception of animal-727 welfare advocacy. Speciesism had a weak negative correlation with guilt and animal 728 product restriction, and a moderate negative correlation with animal-welfare 729 advocacy, suggesting that the more a person endorses Speciesism, the less guilty 730 they feel about their consumption of animal products, the less inclined they are to 731 increase their restriction of animal products, and the less likely they are to engage in 732 animal-welfare advocacy.

In sum, 4N endorsement predicted a number of outcomes related to animalproduct consumption, animal-welfare advocacy, Speciesist attitudes, and the selfdirected 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.

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739
          Study 5 – Test-Retest Validity of the 4N Scale and Actual Meat Consumption
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               So far we have shown 4N endorsement to be consistently higher among
       individuals who self-identify as omnivores than among individuals who identify as
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       partial vegetarians, full vegetarians, and vegans. In Study 5, we sought to show that
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       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
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745
       justifications are rationalizations fueled by a desire to continue eating meat, we also
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       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,
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748
       we made minor adjustments to several of the Normal items (in Studies 2-4 the
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       Normal subscale consistently had the lowest Cronbach's \alphas), and we administered
750
       the final version of the 4N scale to the same sample at two different time points to
751
       establish the instrument's test-retest reliability.
```

752 Method

753 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 754 755 were located in the U.S. and paid for participating in a short, two-part study. At Time 756 1, participants were informed that they would be taking part in a two-part study. 757 Eleven days later participants were contacted by email and invited to complete Part II. 758 Participants were given a span of three days to complete Part II. They were given a 759 security password to enter the survey. In order to anonymously link their responses 760 from Parts I and II, participants were instructed to generate a unique, memorable code 761 to enter at Time 1 and Time 2 (emails were also collected at both time points to help 762 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%).

770 Materials and procedures. The surveys comprising Parts I and II were 771 identical. First, participants answered a slightly revised version of the 16-item 4N 772 scale. Two of the most problematic Normal items were amended in an attempt to 773 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 774 775 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 776 777 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 778 779 followed by a dietary questionnaire assessing the average number of days per week 780 (1-7) they ate various animal products (beef, pork, lamb, chicken, fish, seafood, eggs, 781 dairy) and non-animal products (bread, rice, vegetables, fruit). We included non-782 animal food products as a test of discriminant validity; the 4N scale should only 783 correlate with animal-product consumption. Next they responded to a 7-item Meat 784 Commitment Scale (MCS) developed by the authors (see Appendix C for items). 785 Lastly, they answered a basic demographics questionnaire. They were debriefed and 786 paid at both time points.

787 Results

7884N intercorrelations and internal reliability. All 4N subscales correlated789strongly with the full scale (rs = .86 - .93, ps < .001), and with each other (rs = .69 - .81,790ps < .001). The correlations between the 4N subscales ranged from .69 to .81, all791significant at p < .001. The Cronbach's α of the full scale was .95 at Time 1 and .94 at792Time 2.

793 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 794 795 variance). All 16 items loaded together above .30 (see Table 6 for factor loadings, 796 means and standard deviations). The item "Not eating meat is socially unacceptable" 797 had the lowest loading, probably due to the quite low endorsement of this item.¹¹ The 798 two lowest loading items, both from the Normal subscale, cross-loaded with a 799 potential second factor (eigenvalue = 1.65; 10% of the total variance).¹² In the 800 General Discussion, we speculate as to why these two items behaved somewhat 801 differently from the others. 802 [Insert Table 6 about here] 803 Test-retest reliability of 4N scale. The overall test-retest reliability of the full 804 4N scale was strong, r(134) = .93, p < .001. Table 9 depicts the test-retest correlations 805 for each of the subscales. The rs ranged from .71 (Normal) to .92 (Nice), with all rs 806 significant at p < .001. Thus, the 4N scale had strong test-retest reliability over a 807 period of about two weeks. The Normal subscale had the weakest test-retest 808 reliability, though it reached adequate levels of reliability.

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).

809	[Insert Table 7 about here]
810	4N endorsement. Repeated-measures t-tests were carried out on the 4N
811	subscale means. Nice ($M = 5.02$, SD = 1.54) was endorsed at the highest level, and at
812	a level significantly higher than the other three Ns, $ps < .001$. Next, Natural ($M =$
813	4.80, SD = 1.41) and Normal (M = 4.72, SD = 0.94) were endorsed at equal levels, p
814	= .165, and at levels significantly greater than Necessary (M = 4.16, SD = 1.76), $ps <$
815	.001, which had the lowest level of endorsement. Overall, men endorsed the 4Ns to a
816	significantly greater extent than did women ($M_{\text{men}} = 4.79$, SD = 1.23 vs. $M_{\text{women}} =$
817	4.43, SD = 1.33), $F(1, 234) = 4.15$, $p = .043$, $\eta^2_p = .017$. Men had higher means for all
818	4Ns though only for Natural and Normal were the means significantly higher than for
819	women.
820	Commitment to eating meat. The MCS had a strong test-retest reliability of
821	$r(134) = .93$, $p < .001$, and a strong internal reliability, Cronbach's $\alpha = .96$ (Time 1),
822	α = .96 (Time 2). Men were significantly more committed to eating meat (<i>M</i> = 4.87,
823	SD = 1.70) than were women (M = 4.39, SD = 1.80), $F(1, 234) = 4.07$, $p = .045$, $\eta^2_p =$
824	.017, which is consistent with much past research (e.g., Fagerli & Wandel, 1999;
825	Rappoport, Peters, Downey, & McCann, 1993; Rothgerber, 2013; Ruby & Heine,
826	2012). As can be seen in Table 8, the full 4N scale highly correlated with a
827	commitment to eating meat. ¹³ As an exploratory analysis, we entered each of the 4N
828	subscales simultaneously into a regression predicting MCS ratings at Time 1.14 Multi-
829	collinearity was a concern, but it was not so problematic to make the test unreliable
830	(Tolerance range: .2238; VIF range: 2.63-4.51). All four subscales were positively
831	predictive of a commitment to eating meat (β s: 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.

832	Normal = $.08$; Nice = $.14$); however, only the Necessary and Nice subscales were
833	significant, independent predictors, $ps < .05$ (all other $ps > .13$).
834	[Insert Table 8 about here]
835	Meat consumption. As can be seen in Table 8, the 4N scale selectively
836	correlated with measures of the frequency with which participants consumed animal
837	products, but it did not correlate with consumption frequencies for non-animal food
838	products. The correlations were strongest for meat products (e.g., beef, chicken,
839	pork), but were significant for eggs and dairy products as well. Of the 4Ns,
840	endorsement of Necessary was the most reliable correlate of animal-product
841	consumption. It significantly correlated with the consumption of all eight categories
842	of animal products.
843	General Discussion
844	Morally motivated vegetarians, although a minority, may serve as a source
845	of implicit moral reproach for many omnivores, eliciting behaviors designed to
846	defend against moral condemnation (Minson & Monin, 2012). One method for
847	rendering moral vegetarians nonthreatening, examined here, is to rationalize or
848	provide reasonable justification for one's consumption of animal products. The
849	present research built upon the theorizing of Joy (2010) pertaining to the 3Ns of
850	Justification-that eating meat is natural, normal, and necessary. To this list, we
851	added a fourth N-that eating meat is nice (i.e., enjoyable, satisfying, etc.).
852	Consistent with this theorizing, Studies 1a-1b identified the 4Ns (Natural, Normal,
853	Necessary and Nice) as the principal justifications used to argue for the
854	acceptability of eating meat. Furthermore, Studies 2-5 documented the relationship
855	between 4N endorsement and a number of important variables related to meat
856	consumption and animal-welfare concerns.

857 Overall, omnivores tended to endorse the 4Ns more so than partial 858 vegetarians, full vegetarians, and vegans (Studies 2 and 4). Moreover, individuals 859 who tended to endorse the 4Ns included fewer animals in their circle of moral 860 concern (Study 2), attributed fewer mental capacities to cows (Study 2), were more 861 tolerant and supportive of social inequality (Study 2), were less motivated by ethical 862 concerns when making food choices (Study 3), were less active in advocating on 863 behalf of animals (Study 4), held Speciesist attitudes more strongly (Study 4), were 864 less proud of their consumer choices pertaining to animals (Study 4), were less 865 likely to be moving towards greater restriction of animal products in their diet 866 (Study 4), tended to consume meat and other animal products more frequently in 867 their weekly diet (Study 5), and tended to be highly committed to eating meat in the 868 future (Study 5). Furthermore, omnivores who strongly endorsed the 4Ns tended to 869 experience less guilt with regards to their animal-product choices than did 870 omnivores who endorsed the 4Ns to a lesser extent (Study 4), suggesting that the 871 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 872 873 diffuse the guilt one might otherwise experience when consuming animal products. 874 Implications for omnivore-vegetarian discourse 875 In Study 2, we observed that omnivores tended to endorse all four of the Ns,

while vegetarians and partial-vegetarians tended not to endorse an rour 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

882 disagreement across dietary groups were Necessary and Nice. This suggests that 883 beliefs about the necessity of eating meat, and the pleasure derived from eating 884 meat, may be the least persuasive of the 4Ns in convincing a vegetarian audience. It 885 also suggests, as we observed in Study 5, that Necessary and Nice may be the most 886 useful N for predicting divergent dietary attitudes. By contrast, endorsement of the 887 naturalness of eating meat (e.g., that human beings have evolved body structures 888 adapted to eating meat) was the most uniform across dietary groups, in that it 889 produced the highest ratings of endorsement among vegetarians (though still below 890 the mid-point). In other words, the belief that it is natural to eat meat may be most 891 widely accepted of the 4Ns as having a factual basis. We might speculate that 892 beliefs about the naturalness of eating meat may be the most persistent and difficult 893 to overturn. Looking to the future, independent manipulations of the 4Ns would 894 help clarify these issues.

895 Future research might also test which of the 4N justifications present the 896 greatest challenge to meat-reduction campaigns aimed at promoting healthy and 897 environmentally sustainable eating habits. Based on our observations, we would 898 speculate that the perceived necessity of meat consumption may be the most 899 formidable of the 4Ns given that it is frequently offered in defense of eating meat 900 (Studies 1a-1b) and strongly endorsed by omnivores as a justification (Studies 2-5), 901 though we acknowledge as others have (e.g., Lea & Worsely, 2001) that the 902 niceness, or hedonic pleasure, derived from meat is another formidable obstacle.

903 The 4N

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 the 4N scale and the Direct-strategies subscale of Rothgerber's (2013) MEJ scale. 922 923 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

932 supporting meat consumption. For example, Natural in the 4N classification 933 encompasses several of the MEJ subscales, including hierarchy, fate, and religion. 934 Second, the 4N scheme includes one major justification category largely missing 935 from the MEJ—that eating meat is *normal*. Finally, the factor structure of the 4N 936 scale is more internally coherent than the factor structure of the MEJ. Conceptually, 937 the MEJ scale is purportedly measuring nine lower-order, or two higher-order, 938 constructs (see Rothgerber, 2013), while the 4N scale is arguably measuring one 939 construct (meat-eating rationalizations) with four subcomponents. Consistent with 940 this conceptualized structure, we consistently obtained single-factor structures for 941 the 4N scale. By contrast, the MEJ produced two, possibly three, independent 942 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.

950 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.

989 Conclusion

990 The relationships people have with animals are complicated. While most 991 people enjoy the company of animals and billions of dollars are spent each year on 992 pet care and maintenance, most people continue to eat animals as food (Herzog, 993 2010; Joy, 2010). People employ a number of strategies to overcome this apparent 994 contradiction in attitude and behavior (Loughnan et al., 2014). As we have seen 995 here, one important and prevalent strategy is to rationalize that meat consumption is 996 natural, normal, necessary, and nice. Rationalizing enables omnivores to continue in 997 a dietary practice that has increasingly come under public scrutiny. It is difficult to 998 predict whether endorsement of the 4Ns will decrease over time. However, like 999 many controversial issues (see Liu & Ditto, 2013), as attitudes towards meat 1000 consumption shift, so too may the beliefs that support them.

1002	Acknowledgments
1003	We thank Paul Rozin for helpful discussions and Natalie Peelish for her
1004	assistance with Study 1a, and Kristin Wegener for her assistance with Study 1b.
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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 Par Vegetarian	rtial 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 o Dietary Veg	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 Ve	egan 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 s	should always elevate human interests over the interests of animals.			
2. Whe	n human interests conflict with animal interests, human interests should			
alwa	ys 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.				
(reve	(reverse scored)			
5. Havi	ng extended basic rights to minorities and women, it is now time to			
exter	nd them also to animals. (reverse scored)			

1022	Appendix C
1023	Meat Commitment Scale Used in Study 5
1024	1. I don't want to eat meals without meat.
1025	2. When choosing food, I virtually always select the meat option.
1026	3. I can't imagine giving up meat.
1027	4. I am committed to eating meat.
1028	5. The best part of most meals is the meat portion.
1029	6. I would never give up eating meat.
1030	7. I cannot imagine substituting meat from a meal.
1031	
1032	
1033	

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1206 Table 1

1205

1207 Coding scheme used to score participants spontaneous meat-eating justifications in

1208 Studies 1a-1b.

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

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

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

1213 Correlations between the 4N scale and other measures in Study 2

1215

1216

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

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

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

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

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

 $\overline{Note. * p < .05. ** p < .01. *** p < .001. Non-ethical motivations from FQC (Steptoe et al., 1995); ethical motivations from Lindeman and$

Väänänen (2000). Ns = 192 non-vegetarians/vegans.

Table 5

Correlations between 4N scale and measures from Study 4.

Mean (SD)	2	3	4	5	6	7	8
3.30	.42***	22**	.08	.03	24**	25***	41***
(1.28)							
3.55	-	10	17*	10	09	36***	19**
(1.31)							
4.69	-	-	45***	15*	.63***	.23**	.28***
(1.68)							
2.75	-	-	-	.31***	61***	.09	22**
(1.58)							
2.70	-	-	-	-	28***	.10	05
(1.64)							
6.31	-	-	-	-	-	.19**	.28***
(1.77)							
2.09	-	-	-	-	-	-	.21**
(0.80)							
5.09	-	-	-	-	-	-	-
(1.41)							
	Mean (SD) 3.30 (1.28) 3.55 (1.31) 4.69 (1.68) 2.75 (1.58) 2.70 (1.64) 6.31 (1.77) 2.09 (0.80) 5.09 (1.41)	$\begin{array}{c cccc} Mean & 2 \\ (SD) \\\hline 3.30 & .42^{***} \\ (1.28) \\ 3.55 & - \\ (1.28) \\ 3.55 & - \\ (1.31) \\ 4.69 & - \\ (1.68) \\ 2.75 & - \\ (1.68) \\ 2.75 & - \\ (1.58) \\ 2.70 & - \\ (1.58) \\ 2.70 & - \\ (1.64) \\ 6.31 & - \\ (1.77) \\ 2.09 & - \\ (0.80) \\ 5.09 & - \\ (1.41) \\ \hline \end{array}$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				

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

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	.716	4.05 (2.02)
need on an all plant-based diet.		
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	.847	4.74 (1.83)
sense to leave it out.		
The best tasting food is normally a meat based dish (e.g.,	.821	5.08 (1.80)
steak, chicken breast, grilled fish).		
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).

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.

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



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.