Short Communication

What's your beef with vegetarians? Predicting anti-vegetarian prejudice from pro-beef attitudes across cultures

Megan Earle *, Gordon Hodson

Brock University, St. Catharines, Ontario L2S 3A1, Canada

ABSTRACT

Contrary to other forms of prejudice (e.g., racism), explicit expressions of anti-vegetarian/vegan prejudice are common. But this bias has only recently received empirical attention, with very little cross-cultural evidence. Some theoretical approaches (e.g., Social Identity Theory) focus on social factors in understanding intergroup relations, but there is growing recognition that individual differences may also be crucial in understanding group processes. Here we hypothesize that the degree to which an individual enjoys (likes/desires/consumes) beef may be systematically related to prejudice towards non-meat eaters. Using data from the U.S.A, France, Brazil, and Argentina ($N = 1695$) we find that pro-beef attitudes are a robust predictor of anti-vegetarian prejudice across cultures ($\beta = 0.47$), with a particularly strong association in the USA ($\beta = 0.65$), where 43% of anti-vegetarian attitudes are explained by individual differences in beef enjoyment. This work contributes a cross-cultural comparison of anti-vegetarian prejudice and its predictors to the rapidly expanding literature on bias towards this growing social group.

© 2016 Elsevier Ltd. All rights reserved.

"Vegetarians, and the Hezbollah-like splinter faction, the vegans, are a persistent irritant to any chef worth a damn… Vegetarians are the enemy of everything good and decent in the human spirit, an affront to all I stand for, the pure enjoyment of food."

[Anthony Bourdain, TV food commentator ("Vegans vs. Anthony Bourdain", n.d.)]

1. Introduction

Whereas people often avoid open expressions of prejudices towards racial outgroups (e.g., Hodson, Dovidio, & Gaertner, 2002), the same is not true regarding prejudices towards vegetarians/vegans (v*gans), a group estimated to be as large other studied social groups (e.g. gays/lesbians, Muslims) and is growing ("Table: Muslim Population", 2011; Laumann, Gagnon, Michael, & Michaels, 1994; Young-Powell & Gil, 2015). In addition to anecdotal expressions of bias, as per the Anthony Bourdain quotation, v*gans are commonly associated with negatively valenced terms (e.g., up-tight, crazy; Minson & Monin, 2012), evaluated as negatively (or more negatively) than other commonly studied targets of prejudice (e.g. Blacks, homosexuals), and discriminated against in hiring decisions and social relationships (MacInnis & Hodson, in press).

Indeed, it is widely recognized that people show a preference for their own groups over outgroups. Social Identity Theory (SIT), for instance, posits that group membership is part of an individual's identity, and that people are motivated to view their group as distinct from, and more positive than, other groups (Tajfel & Turner, 1979). This bias most commonly results in ingroup favoritism, differentially showing preference in evaluations regarding, or outcomes allocated to, one's own group at the expense of another (Brewer, 1979).

In addition to group membership and an emphasis on differential social categorization however, there is growing consensus that individual differences are relevant, if not crucial, in predicting outgroup attitudes. Meta-analytic research shows that individual differences in political ideology, fundamentalism, and threat (among others) are meaningfully associated with prejudice, often with correlations in the 0.40–0.50 range (see Hodson & Dhont, 2015). We predict that individual differences in pro-meat attitudes are systematically related to anti-vegetarian prejudice, such that those who enjoy beef more (*vs.* less) will express greater prejudice towards vegetarians. This is consistent with preliminary evidence from a Belgian sample, which shows that greater liking of the taste/look/smell of meat was positively associated with vegetarian culture threat (Dhont & Hodson, 2014, Study 2). However, that study did not directly examine attitudes towards vegetarians, leaving a gap in our understanding of the relation between attitudes towards meat and anti-vegetarian prejudice.

Particularly lacking is a cross-cultural comparison of anti-vegetarian prejudice. That is, any relation between pro-meat attitudes and anti-vegetarian prejudice may depend on the centrality of meat in the

* Corresponding author.
E-mail addresses: me11tt@brocku.ca (M. Earle), ghodson@brocku.ca (G. Hodson).

broader cultural context (e.g. social or economic relevance of meat in one's culture). Ruby et al. (2016) provide valuable insights on this topic by assessing variables regarding pro-beef attitudes and anti-vegetarian prejudice in different countries (USA, France, Brazil, and Argentina). Focusing on specific, lower-level scales, Ruby and colleagues found relations between specific beef variables (e.g., desire beef) and particular anti-vegetarian variables (e.g., resist dating) in the 0.20 range (<5% of variance explained). We postulate that capturing the common or shared variance among the various beef enjoyment items as a latent variable, and setting that latent factor to predict a latent variable capturing the common/shared variance among the anti-vegetarian items, could reveal substantial relations between *beef enjoyment* and *anti-vegetarian prejudice* as conceptual constructs. Such findings would be consistent with past findings that higher-order (i.e., latent) relations are stronger than those between the lower-level components in domains such as subjective well-being (MacInnis, Busseri, Choma, & Hodson, 2013), and generalized authoritarianism and prejudice (Hodson, MacInnis, & Busseri, 2017). We will then statistically compare the strength of these relations between countries to determine if the strength of beef enjoyment as a predictor of anti-vegetarian prejudice varies across contexts.

2. Method

We used correlations and descriptive statistics reported in Ruby et al. (2016) to examine the relation between pro-beef attitudes and anti-vegetarian prejudice (as latent factors) in each country separately, as well as averaged across countries. We then examine whether the relation between beef enjoyment and anti-vegetarian prejudice differs *between* countries.

2.1. Participants

The full sample comprised 1695 university students from Argentina ($n = 304$, 84% women, $M_{age} = 23.6$, $SD_{age} = 2.89$), Brazil ($n = 583$, 62% women, $M_{age} = 21.3$, $SD_{age} = 2.46$), France ($n = 441$, 62% women, $M_{age} = 21.6$, $SD_{age} = 1.46$) and the USA ($n = 367$, 65% women, $M_{age} = 21.5$, $SD_{age} = 3.21$). Most participants identified as meat-eaters (approximately 95–98% across samples). For recruitment procedures, see Ruby et al. (2016).

2.2. Measures

2.2.1. Beef valence
Participants wrote down the first three words that came to mind when thinking of beef. Then they assigned each word with a positive, negative or neutral value ($+1$, -1, or 0 respectively). These values were summed into an index.

2.2.2. Beef liking
Participants indicated their liking of beef on a scale of 0 (not at all) to 100 (one of your most favorite foods in the world).

2.2.3. Beef desire
Participants indicated how often they desired beef so strongly that they go out of their way to obtain it, on a scale of 1 (never) to 5 (almost daily).

2.2.4. Beef consumption
Participants indicated the number of times they eat beef per month.

2.2.5. Admire vegetarians
Participants indicated agreement with the statement "I admire vegetarians" on a scale ranging from -3 (disagree strongly) to $+3$ (agree strongly).

2.2.6. Bothered by vegetarians
Participants indicated agreement with the statement "Vegetarians bother me" on a scale ranging from -3 (disagree strongly) to $+3$ (agree strongly).

2.2.7. Not date vegetarians
Participants indicated agreement with the statement "I would prefer to date a vegetarian" on a scale ranging from -3 (disagree strongly) to $+3$ (agree strongly). This measure was reverse-coded such that higher scores reflect stronger greater desire to not date a vegetarian.[1]

3. Results

First we tested whether pro-beef attitudes predict anti-vegetarian prejudice in each country separately. We used maximum likelihood estimation in AMOS v24.0 (Arbuckle, 2006) to analyze the relations based on the correlations, means and standard deviations provided by Ruby et al. (2016).[2] Note that Ruby et al. reported correlations for each country after partialling out the effect of gender, a reasonable step given sex differences observed in attitudes towards vegetarians/vegans (MacInnis & Hodson, in press). First we specified a latent beef enjoyment factor with four indicators: beef valence, beef liking, beef desire, and beef consumption. We also specified a latent anti-vegetarian prejudice factor with three indicators: admire vegetarians (reverse-coded), bothered by vegetarians, and not date vegetarians. Latent factors are computed to reflect the variance that is common or shared among indicators. Loadings on both latent factors were freely estimated. Parameter estimates and significance tests were based on bias-corrected estimates derived from 1000 bootstrap samples (see Shrout & Bolger, 2002). To ensure that pro-beef attitudes and anti-vegetarian prejudice represent two distinct factors, rather than one underlying construct, we assessed model fit statistics for both one-factor and two-factor model solutions. The results suggest the viability of a two-factor (*vs.* one-factor) model solution (see Supplemental Table 1). Moreover, in the full sample strong loadings on the pro-beef attitude (0.46–0.95) and on the anti-vegetarian (0.55–0.74) factors suggest adequate construct validity. We then set the latent beef enjoyment factor to predict the latent anti-vegetarian factor.

In each country there was a significant positive relation between latent pro-beef attitudes and latent anti-vegetarian prejudice. Table 1 shows the standardized effects, their 95% confidence intervals, and proportion of variance in anti-vegetarian prejudice explained by pro-beef attitudes. Fig. 1 illustrates the association between pro-beef attitudes and anti-vegetarian prejudice in the American sample.

Additionally, we used a random effects approach to compute a meta-analytic average for the relation between pro-beef attitudes and anti-vegetarian prejudice across all four countries (see Goh, Hall, & Rosenthal, 2016). All associations were Fisher's *z*-transformed for analysis and converted back to regression coefficients for presentation (Sibley, 2008). Across the four countries, pro-beef attitudes were significantly positively associated with anti-vegetarian prejudice ($\beta_{mean} = 0.466$, $p < 0.001$, 95% CI [0.308, 0.599]). Results were largely the same using a fixed effects approach ($\beta_{mean} = 0.460$, $p < 0.001$, 95% CI [0.421, 0.497]).

3.1. Comparing associations between countries

Using multiple groups' analyses, we tested whether the relation between pro-beef attitudes and anti-vegetarian prejudice differed between countries. For each possible pair of countries, model fit of an unconstrained (baseline) model was compared a constrained model in

---

[1] Reverse-coding was not described by Ruby et al. (2016) but was confirmed via personal communication.

[2] AMOS works from raw data or from such a matrix as provided by the correlations, means and standard deviations (Kline, 2011).

Table 1
Standardized paths between beef enjoyment and anti-vegetarian prejudice.

Country	N	β	95% CI	R^2
USA	367	0.654	[0.561, 0.740]	0.43
Brazil	583	0.497	[0.407, 0.589]	0.25
France	441	0.400	[0.286, 0.517]	0.16
Argentina	304	0.266	[0.115, 0.405]	0.07

Note. Bootstrapping ($N = 1000$) with 95% bias-corrected estimates. Standardized betas shown (each value is significant $p < 0.01$).

which equivalence of the path between pro-beef attitudes and anti-vegetarian prejudice was imposed. A significant increase in model chi-square (i.e. a significant decrement in model fit) when the path is constrained (vs. unconstrained) indicates that the relation between pro-beef attitudes and anti-vegetarian prejudice differs significantly between the two countries. We also examined 95% CIs around the standardized path coefficient in each pair of countries. If confidence intervals do not overlap this also indicates that the relation between beef enjoyment and anti-vegetarian prejudice differs significantly between countries.

When paths between pro-beef attitudes and anti-vegetarian prejudice were imposed to be equivalent between the models for the American and French samples, there was a significant decrement in fit relative to a model with an unconstrained path ($\Delta x^2(1) = 3.93$, $p = 0.047$). Further, the 95% CIs do not overlap (see Table 1), corroborating that the relation between pro-beef attitudes and anti-vegetarian prejudice is stronger in the American than the French sample.

Similar results were found regarding the USA and Argentina. When paths were constrained to be equal (vs. unconstrained) there was a significant decrement in model fit ($\Delta x^2(1) = 4.03$, $p = 0.045$). Further, the 95% CIs across the American and Argentinean samples do not overlap (see Table 1): the relation between pro-beef attitudes and anti-vegetarian prejudice is stronger in the American than the Argentinian sample. For all other comparisons, imposing equivalence between paths did not lead to a significant decrement in model fit (ps range from 0.099 to 0.682) and the CIs overlapped, meaning that those cross-nation comparisons were not statistically significant.

4. Discussion

Results from this study show that a relatively large amount of variance in anti-vegetarian prejudice can be explained by individual differences in attitudes towards beef (approximately 22% on average). This value is comparable to well-known predictors of prejudice, such as realistic and symbolic threat (Riek, Mania, & Gaertner, 2006), and are considered (very) large effect sizes (Gignac & Szodorai, 2016). The lower-level correlations between beef-relevant and prejudice-relevant correlations reported in Ruby et al. (2016) were in the 0.20 range (<5% variance in prejudice explained). Our analyses examined the relation between latent constructs, where the relation was much stronger,

explaining 16–43% of the variance in 3 of the 4 samples (averaging 22% across samples). Thus, the relation is at least 4 times stronger than originally realized. Of note, the measures reported in Ruby et al. (2016) were mostly single-item measures. We found that these items loaded highly on their respective factors, suggesting adequate construct validity, but future researchers are advised to use well-validated, multi-item measures. Still, our results suggest that, in addition to group membership, individual differences in attitudes towards meat are clearly important in understanding anti-vegetarian prejudice. Overall, the relation between pro-beef and anti-vegetarian attitudes was significant across all four countries examined.

Despite this robust pattern we also uncovered cultural variation in the relation between pro-beef attitudes and anti-vegetarian prejudice, with a particularly strong association in the US. Thus, cultural factors also play a role. Indeed, countries with the strongest relations in the current study were the US and Brazil, two of the world's largest beef producers, ranking second and third globally respectively ("Countries Compared by Agriculture", 2001). Interestingly, France and Argentina, which showed weaker relations between pro-beef and anti-vegetarian attitudes, rank lower in economic dependence on beef production (fourth and twelfth respectively; "Countries Compared by Agriculture", 2001). Differences between countries may also be due to cultural differences in vegetarian sentiments. For instance, vegetarianism may be discussed more widely in the USA, resulting in more individuals forming attitudes towards vegetarians. People may also differ across cultures in their willingness to express anti-vegetarian attitudes, resulting in different associations between beef enjoyment and anti-vegetarian prejudice. Future research may explore such influences on anti-vegetarian prejudice in a greater variety of countries.

The correlational design employed has its limitations, particularly with regard to establishing causality. Future research may experimentally manipulate beef enjoyment, explore relations between pro-beef attitudes and anti-vegetarian prejudice longitudinally, and explore presently unknown factors that moderate the established relation. Future research may also explore the relation between pro-meat attitudes and prejudice towards vegans (i.e., those who, in addition to avoiding meat, avoid all animal products). Given that vegans are evaluated more negatively than vegetarians (MacInnis & Hodson, in press), the relation between pro-meat attitudes and anti-vegan prejudice may be even stronger. Future research may also explore this relation, here observed with regard to beef, to other meats or animal products.

4.1. Conclusion

The current study demonstrates that individual differences in attitudes towards meat may be crucial for understanding prejudice towards vegetarians, which appears to be widespread and often explicit. Moreover, this study suggests that pro-beef attitudes systematically predict more anti-vegetarian attitudes across countries, and that cultural context also plays a role in determining the strength of this relation.
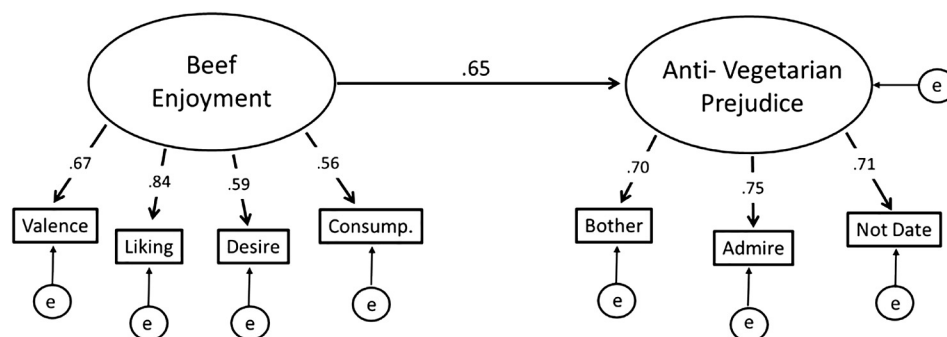

Fig. 1. Relation between latent beef enjoyment and latent anti-vegetarian prejudice in the American sample ($N = 367$). Standardized path coefficients and factor loadings shown (all $p < 0.01$).

With personal beef enjoyment predicting the degree of negative social attitudes (towards vegetarians), these findings are consistent with growing evidence that anti-vegetarian attitudes reflect a defensive reaction that varies as a function of personal factors (see MacInnis & Hodson, in press). As a relatively new and unexplored research area, future work may pursue a greater understanding of anti-vegetarian or anti-vegan prejudice from social identity, cultural, and individual difference perspectives.

Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.paid.2017.06.034.

Funding sources

References

Arbuckle, J. L. (2006). *Amos (Version 22.0) [Computer software].* Chicago, IL: SPSS.
Brewer, M. B. (1979). Ingroup bias in the minimal group situation: A cognitive motivational analysis. *Psychological Bulletin, 86,* 307–324. http://dx.doi.org/10.1037/0033-2909.86.2.307.
Countries compared by agriculture > produce > meat > production (2001). Food and agriculture organization of the United Nations. Retrieved from http://www.nationmaster.com/country-info/stats/Agriculture/Produce/Meat/Production.
Dhont, K., & Hodson, G. (2014). Why do right-wing adherents engage in more animal exploitation and meat consumption? *Personality and Individual Differences, 64,* 12–17. http://dx.doi.org/10.1016/j.paid.2014.02.002.
Gignac, G. E., & Szodorai, E. T. (2016). Effect size guidelines for individual differences researchers. *Personality and Individual Differences, 102,* 74–78. http://dx.doi.org/10.1016/j.paid.2016.06.069.
Goh, J. X., Hall, J. A., & Rosenthal, R. (2016). Mini meta-analysis of your own studies: Some arguments on why and a primer on how. *Social and Personality Psychology Compass, 10,* 535–549. http://dx.doi.org/10.1111/spc3.12267.
Hodson, G., & Dhont, K. (2015). The person-based nature of prejudice: Individual difference predictors of intergroup negativity. *European Review of Social Psychology, 26,* 1–42. http://dx.doi.org/10.1080/10463283.2015.1070018.

Hodson, G., Dovidio, J. F., & Gaertner, S. L. (2002). Processes in racial discrimination: Differential weighting of conflicting information. *Personality and Social Psychology Bulletin, 28,* 460–471. http://dx.doi.org/10.1177/0146167202287004.
Hodson, G., MacInnis, C. C., & Busseri, M. A. (2017). Bowing and kicking: Rediscovering the fundamental link between generalized authoritarianism and generalized prejudice. *Personality and Individual Differences, 104,* 243–251. http://dx.doi.org/10.1016/j.paid.2016.08.018.
Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3rd ed.). New York: Guilford Press.
Laumann, E., Gagnon, J. H., Michael, R. T., & Michaels, S. (1994). *The social organization of sexuality: Sexual practices in the United States.* Chicago, IL: University of Chicago Press.
MacInnis, C. C., Busseri, M. A., Choma, B. L., & Hodson, G. (2013). The happy cyclist: Examining the association between generalized authoritarianism and subjective well-being. *Personality and Individual Differences, 55,* 789–793. http://dx.doi.org/10.1016/j.paid.2013.06.018.
MacInnis, C. C., & Hodson, G. (2017). It ain't easy eating greens: Evidence of bias toward vegetarians and vegans from both source and target. *Group Processes & Intergroup Relations,* 1–24. http://dx.doi.org/10.1177/1368430215618253 (in press).
Minson, J. A., & Monin, B. (2012). Do-gooder derogation: Disparaging morally motivated minorities to defuse anticipated reproach. *Social Psychological and Personality Science, 3,* 200–207. http://dx.doi.org/10.1177/1948550611415695.
Riek, B. M., Mania, E. W., & Gaertner, S. L. (2006). Intergroup threat and outgroup attitudes: A meta-analytic review. *Personality and Social Psychology Review, 10,* 336–353. http://dx.doi.org/10.1207/s15327957pspr1004_4.
Ruby, M. B., Alvarenga, M. S., Rozin, P., Kirby, T. A., Richer, E., & Rutsztein, G. (2016). Attitudes toward beef and vegetarians in Argentina, Brazil, France, and the USA. *Appetite, 96,* 546–554. http://dx.doi.org/10.1016/j.appet.2015.10.018.
Shrout, P. E., & Bolger, N. (2002). Mediation in experimental and nonexperimental studies: New procedures and recommendations. *Psychological Methods, 7,* 442–445. http://dx.doi.org/10.1037//1082-989X.7.4.422.
Sibley, C. G. (2008). *Utilities for examining simple meta-analytic averages [computer software].* University of Auckland.
Table: Muslim population by country (2011, January, 27). Pew research center. Retrieved from http://www.pewforum.org/2011/01/27/table-muslimpopulation-by-country/.
Tajfel, H., & Turner, J. C. (1979). An integrative theory of intergroup conflict. In W. G. Austin, & S. Worchel (Eds.), *The social psychology of intergroup relations* (pp. 33–47). Monterey, CA: Brooks/Cole Publishing Company.
Vegans vs. Anthony Bourdain? (d). PETA. Retrieved from http://www.peta.org/living/food/vegans-vs-anthony-bourdain/ (n.d.).
Young-Powell, A., & Gil, N. (2015, April 10). Should everyone become vegetarian? The Guardian. Retrieved from https://www.theguardian.com/education/2015/apr/10/should-everyone-become-vegetarian.

Supplemental Table 1

Model fit indices for one-factor versus two-factor models

	x^2	x^2 p-value	CFI	GFI	TLI	RMSEA	SRMR
USA							
1-factor	149.60	<.001	.823	.880	.734	.163	.082
2-factor	42.03	<.001	.962	.968	.939	.078	.038
Brazil							
1-factor	293.57	<.001	.738	.856	.606	.185	.102
2-factor	45.09	<.001	.970	.979	.951	.065	.042
France							
1-factor	164.02	<.001	.706	.900	.558	.156	.100
2-factor	23.01	.042	.980	.986	.968	.042	.034
Argentina							
1-factor	116.95	<.001	.679	.902	.518	.156	.108
2-factor	23.52	.052	.970	.979	.955	.047	.056
Overall							
1-factor	660.90	<.001	.752	.891	.628	.165	.097
2-factor	125.74	<.001	.957	.979	.930	.072	.048

Note: x^2 degrees of freedom are 14 (1-factor model) and 13 (2-factor model). CFI = comparative fix index; GFI = goodness of fit index; TLI = Tucker-Lewis coefficient; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual.