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Farm animal welfare regulatory preferences and food choice: survey evidence from the US

Albert Boaitey^{1*}

*Correspondence:
albert.boaitey@newcastle.ac.uk

¹ Centre for Rural Economy,
School of Natural
and Environmental Sciences,
Newcastle University, Room 3.10,
Agriculture Building, Newcastle
Upon Tyne NE1 7RU, England

Abstract

Public support is critical for the incorporation of farm animal welfare (FAW) standards into national food policies. Multiple pathways, e.g., market-based policies, political mandates, and donations to animal charities, exist for the public to influence these standards. The challenge often remains that citizens may express significantly different regulatory preferences from consumers thereby disproportionately overburdening the latter. For food, this consumer–citizen role is directly linked to dietary choice. Although a large body of research has examined the determinants of dietary choice on the one hand, and FAW policy preferences, on the other, no attempt has been made to address these issues side by side. This study explores the preferences for FAW regulatory mechanisms and strategic behavior among dietary groups. Preferences for private labeling, political mandates, and donations to charities in support of and against conventional agriculture are examined. Data are from an online survey of 1020 residents conducted in the US. The results show a proclivity among segments of the public who do not consume livestock products for political mandates and the tendency to behave strategically. Regulatory preferences are embedded within distinct human value orientations. Urban—non-urban, generational and gender divides in regulatory preferences are also identified. These insights are relevant for the ongoing development of FAW standards given the portfolio of mechanisms at the disposal of stakeholders.

Keywords: Animal welfare, Dietary choice, Strategic behavior, Human values, Contingent valuation, Food policy

Introduction

The provision of goods with public good characteristics is often faced with many well-known collective action problems. These problems are pertinent to a class of goods commonly referred to as privately provided public goods (see examples, climate adaptation actions by farmers (Tompkins and Eakin 2012); charitable giving (Andreoni 1995; Grant and Langpap 2019); agriculture and forestry products (Viaggi and Knatelhardt 2021)). Privately provided public goods have public good characteristics but are supplied by private individuals (Bergstrom et al. 1986). While agricultural products can be considered private, farming generates many process attributes (ethical, environmental and health) with public good characteristics. The regulation of process ethical attributes such as

farm animal welfare (FAW) in livestock systems therefore faces incentive compatibility issues associated with other privately provided public goods (Harvey and Carmen 2013).

Consequently, several considerations relevant to the development of the right incentive mechanisms for animal welfare remains of longstanding interest. These include: the elicitation of preferences (e.g., Ufer et al. 2022; Kaminski et al. 2024; Boaitey et al. 2022); public behavior in different regulatory contexts (e.g., Paul et al. 2019; Schulze et al. 2023; Lai et al. 2022); and, the economic impacts of regulatory standards (e.g., Vukina and Oh 2022; Lee et al. 2023). Two factors underscore this interest. First, are the social costs of more stringent FAW regulations given their impact on commonly consumed food products such as eggs (Vukina and Oh 2022). Second, is the attendant issue of the distribution of costs associated with FAW standards (Kotschedoff and Pachali 2020). Indeed, as a consequence of the public good nature of FAW, multiple pathways (market, ballots, and donations to FAW non-governmental groups) exist for influencing regulatory standards. Given these portfolio of options, segments of the public can influence standards through non-market channels and indirectly impose the higher cost of their regulatory preferences on market participants. As a food attribute, it is plausible that the entire cost of higher FAW standards would be borne by the segment of the public who actually consume/purchase a product; while, others enjoy the benefits of improved FAW without incurring any direct costs—a classical free-rider problem with *beggar-thy-neighbor* implications.

A fundamental aspect of understanding the possible incidence of FAW regulation is the heterogeneity in policy preferences, i.e., market, mandates, and support for advocacy, among dietary preference categories. However, the issue of dietary choice and preferences for FAW regulatory mechanisms has typically been examined in isolation and any possible intersections have not been empirically and systematically evaluated (De Backers and Hudders 2015; Thomas et al. 2019). There is also the consequential issue of whether the signaling of FAW values differ systematically across dietary preference categories and in specific regulatory contexts.

This paper examines FAW regulatory preferences in dairy among different dietary preference categories and possible evidence of strategic behavior pertaining to market and non-market regulatory preferences within dietary categories. Specifically, the differences in—market, political and voluntary regulatory mechanisms—among different dietary preference categories (omnivores, flexitarian, vegans, vegetarians, and others) are examined. Although, vegans do not participate in the market for livestock products they may retain an interest in the valuation of FAW in livestock markets due to the public good characteristics of FAW. Market mechanisms denotes the private purchase of products with high FAW standards. Political processes refer to FAW standards mandated through legislative means, e.g., referendums. Segments of the public may also favor donations to not-for-profits campaigning for improved FAW standards on conventional farms or against conventional production practices. The empirical approach centralizes the role of human values and animal attitudes.

The study focusses on dairy production because the welfare impacts of several routine practices such as breeding, disbudding, early calf dam separation, etc., remains contentious among key stakeholders (Jacobs 2020). There is therefore considerable scope for improving FAW standards in dairy using market and non-market mechanisms (Wolf

and Tonsor 2017; The Humane Society US (HSUS) 2009). The present study emphasizes FAW regulations for a number of reasons. These include, the sensitive nature of FAW and its role in meat avoidance (Hagmann et al. 2019), the tendency for the public to overstate their preferences for public goods in general and animal welfare policies in particular (Lai et al. 2022; Batina and Ihori 2005). For instance, major food retailers in the US have signaled their inability to meet commitments to supply 100% cage-free eggs by 2025 (Casey 2023), suggesting possible overenthusiasm in setting FAW standards.

The paper makes a unique contribution to the existing knowledge on the possible sources of heterogeneity in animal welfare regulatory preferences and the overall complexity in the design and implementation of ethical food standards. The failure to examine the possible heterogeneity in regulatory preferences within dietary groups—given the relatively small size of specific dietary groups in the overall population—misses critical insights on the probable incidence of the cost associated with high(er) FAW standards. Indeed, the ability for a small group of consumers to shape production practices through purchase decisions has been noted (Vermier and Verbeke 2006). This role is further pronounced if this segment of the public does not consume the relevant products. Some studies document the determinants of dietary choice (see for example, Allès et al. 2017), others focus on the predictors of FAW policy choice (see for example Smithson et al. 2014), but these issues have not been considered side by side. This study is the first attempt to address this limitation.

The rest of the paper proceeds as follows. In the next section, an overview of the literature on the determinants of dietary choice and preferences for FAW policies is presented. A description of the survey and data collection procedures is provided in the subsequent section. The penultimate section outlines the results of the study. The relevant conclusions and policy recommendations are presented in the last section.

Background on farm animal welfare regulatory mechanisms and preferences

The FAW policy landscape in the US is characterized by a complex mix of private and public governance mechanisms and stakeholder interests. Unlike, for example, the European Union which has a more robust and consistent FAW regulatory framework (Molitorisová and Burke 2023), standards in the US tend to be piecemeal (Carter et al. 2021). Private governance initiatives led by food and non-food retailers coexist with public governance mechanisms in the form of bills and ballot initiatives. Major food corporations such as Walmart, Cargill and Whole Foods Market have set their own FAW targets and labeling schemes (Morath 2018; Global Animal Partnership 2024). Public legislation of FAW in the US is generally limited to the state level. This is due to the absence of a robust federal legislation. Three federal legislations—The Animal Welfare Act, Livestock Transporting Act and Humane Slaughter Act—are relevant in this context. However, the scope and effectiveness of these legislation pertaining to FAW have been questioned. The main federal legislation on animal protection, i.e., the Animal Welfare Act, is generally considered limited as it excludes farm animals from regulation (Morath 2018). Passed in 1966, the law originally focused on animals for research purposes (Price 2022). Other legislation such as the Livestock Transporting Act (“24 Hour Law”) lacks adequate enforcement (Victor 2022). At the state level, approximately 19 bills and ballot initiatives have been adopted in 13 states (Hopkins et al. 2022). Most of the regulations prohibit

practices such as gestation crates, use of veal crates and laying hens cages (The Humane Society of the US 2022). These public and private mechanisms are influenced by the activities of FAW non-governmental organizations (NGOs) and farmer interest (lobby) groups. Farmer groups such as the National Pork Producers Council¹ (NPPC) and the Dairy Farmers of America lobby for legislation that preserves the economic interest of livestock producers. The livestock sector is one of the key economic sectors in US agriculture. Cash receipts in 2022 amounted to an estimated \$267 billion (USDA ERS 2023).

Historically, animal welfare NGOs have played a prominent advocacy role across multiple regulatory contexts in the US. This is in addition to generating awareness about the general state of FAW. Espinosa and Treich (2021) identified two types of FAW NGOs—welfarist NGOs and abolitionist NGOs—based on their approach to advocacy. Abolitionist NGOs (e.g., People for the Ethical Treatment of Animals (PETA)) emphasize animal rights and advocate for ending animal agriculture and transitioning to plant-based diets (PETA 2024a). Welfarist NGOs (e.g., The HSUS) have a less radical view and advocate for the improvement of animal welfare on livestock farm. Despite the differences in orientation, these NGOs exert a significant influence on the FAW regulatory environment in the US. For instance, the HSUS was instrumental in canvassing state-level support for key FAW ballot initiatives such as *Proposition 2* and *Proposition 12* in California, and *Question 3* in Massachusetts (Block and Amundson 2023; Victor 2022). Inter-alia, these laws mandate additional space requirements for laying hens and sows. Farm animal welfare advocacy groups also influence private standards through campaigns and incentive schemes (Compassion in World Farming 2024; HSUS 2024a; ASPCA 2024). The activities of these NGOs are mostly financed by donations from the public. Available estimates indicate that in 2022, public fundraising efforts yielded \$800 million in revenue for animal welfare advocacy groups (National Hog Farmer 2023). In 2023, about 95% (\$158.4 million) of the revenue raised by HSUS was from donations and bequest (HSUS 2024b). Donations (~\$75 million) accounted for the significant proportion of the total revenue (~\$79 million) raised by PETA in 2023 (PETA 2024b).

Three issues are relevant from the foregoing. First, there are multiple pathways through which the public can influence FAW standards. These are mainly through voting in ballot initiatives, private purchase of FAW labeled products, and support for welfarist and abolitionist NGOs. The impact of these mechanisms on FAW standards and public choice is likely to differ.

Second, there is a possible association between dietary preference categories and particular regulatory mechanism given the emphasis of, for example, abolitionist NGOs on transition to vegan diets. In general, food choice is motivated by a variety of factors including prosocial, personal characteristics, and moral consideration (Alles et al. 2017; Colnan et al. 2016; Milfont et al. 2021; Cramer et al. 2017; Rosenfeld et al. 2020; Ruby 2012; Kalof et al. 1999). Moral considerations center around one's beliefs about what is right and wrong (Rosenfeld et al. 2020). People who consider animals as sentient and are opposed to the harm and suffering caused by livestock production practices are likely to switch to vegetarian and vegan diets. Most vegans and vegetarians cite concerns about

¹ The NPPC lost a recent (2023) landmark challenge of California's Proposition 12 at US Supreme Court.

the welfare of animals as one of the main reasons for switching away from livestock products. Some evidence suggests that dietary behaviors may represent part of a broader strategy to instigate political and social change (Kalte 2021; North et al. 2021) and the support for FAW NGOs (Espinosa and Treich 2021).

Third, is the general interest in the predictors of FAW regulatory mechanism which has typically focused on ballot initiatives (Smithson et al. 2014; Bovay and Sumner 2019; Hopkins et al. 2022). The overall findings on these studies suggest the variation in the support for ballot initiatives due to factors such as sociodemographic characteristics (income, rural residence, and gender), political orientation (liberal versus conservative), etc. The latter may be symptomatic of the dichotomy in FAW regulatory preferences due to differences in value orientation. The normative dimension of FAW (Kupsala et al. 2015) supports this assertion. However, the literature on regulatory preferences has not systematically considered the role of value orientations in the preferences for animal welfare regulatory mechanisms. This study aims to fill this gap by examining the possible role of heterogeneity due to dietary preferences as well as human values and animal attitudes. The study also extends the existing preference for FAW regulatory mechanisms literature which has mainly focused on FAW mandates (e.g., see Smithson et al. 2014) by examining other mechanisms (e.g., voluntary donations). Furthermore, consideration is given to differences in FAW valuation for different dietary categories under market and political regulatory scenarios.

The role of human values and animal attitudes

This study evaluates the effect of human values and animal attitudes, as a subset of considerations, on preferences for different FAW regulatory mechanisms. In general, values are principles and goals that guide behavior and preferences (Roccas and Sagiv 2017). This study focusses on human values based on the Schwartz value framework (Schwartz 1992; Schwartz et al. 2012). Schwartz classified values into ten categories: universalism, tradition, stimulation, self-direction, security, hedonism, conformity, benevolence, achievement and power. These values conform to the four higher order human values – *openness to change* (self-direction, stimulation, and hedonism), *conservation* (conformity, security, and tradition), *self-enhancement* (power, achievement, and hedonism) and *self-transcendence* (universalism and benevolence). These four higher order values are underlined by different motivations that shape behavior (Scharfbillig et al. 2024). Conservation emphasizes preference for the status quo versus openness to change which values independence and preference for change. Self-enhancement is a self-oriented focus; while, self-transcendence emphasizes concern for others (Burroughs and Rindfleisch 2002). Individuals' preferences for different FAW regulatory mechanisms are likely to be guided by their principles on independence versus control, and self-concern versus concern for others. This is relevant considering the possible impact of different FAW regulatory schemes on the degree of autonomy, compliance and the wellbeing of others. Human values also form the basis for evaluating policy (Schwartz 2012).

Additionally, this paper evaluates the role of attitudes toward animals using the attitudes toward animals scale (AAS) (Herzog et al. 1991). The AAS measures attitudes toward the treatment and use of animals (Herzog et al. 2015). It has been used in a number contexts including social activism regarding animal rights (Herzog and Golden

2009). Higher scores indicate a greater concern for animal welfare (Herzog et al. 2015) and a tendency to 'take action' regarding the treatment of animals (Suarez-Rojas et al. 2023). Given the range of FAW mechanisms, different approaches are likely to result in varying impacts on FAW. For example, the standards adopted through mandates require universal compliance within their jurisdiction and may have more widespread consequences on FAW as compared to market-based measures such as labels. The rest of the paper addresses these issues using data from a survey of US households.

Methods

Data sources

Data are from an online survey of a nationally representative sample (N=1020) of US respondents conducted in 2021. The survey was vetted and approved by the Institutional Review Board at the University of Wisconsin-River Falls (IRB#:IRB-FY2020-149). Respondents were drawn from a panel maintained by Qualtrics LLC, a market research company. The survey was pre-tested with 100 respondents.

The survey instrument consisted of questions on respondents' FAW perceptions, dietary choices and regulatory preferences. Respondents were asked to select the dietary classification that best described them from a list of options provided. A full description of each of the dietary categories was provided: omnivore, flexitarian, vegetarian, vegan, pescatarians and others. Respondents were also asked to select their preferred mechanism for influencing FAW standards on dairy farms. The options included: private (voluntary) purchase labels (*market*); donations to animal welfare not-for-profits campaigning for higher standards on conventional farms (*positive donation*); donations to animal rights groups campaigning against conventional farming (*antagonistic*); and, government mandated farm animal welfare standards (*political*).

Data from an open-ended (OE) 'consequential' CV design (Gordillo et al. 2019) were used to test the hypothesis of strategic behavior. Contingent valuation is a widely used approach for the measurement of non-market values (Venkatachalam 2004). Individuals' willingness to pay (WTP) are elicited using survey instruments. Previous FAW applications include Bennett and Blaney (2003). The authors used a CV approach to elicit UK citizen's WTP to support legislation on battery cages for egg production (Bennett and Blaney 2003). In this study, respondents were asked to provide their maximum willingness to pay (WTP) (increase (%) in weekly expenditure) for more ethically produced milk.² After being asked to reflect on the values provided in the open-ended question, respondents were asked to state how much they were WTP before they felt that they were paying too much for what the product (milk) was really worth to them. This consequential question is considered the upper bound (choke price) WTP. A priori, it is expected that respondents' WTP in the former case does not exceed the upper bound elicited with the consequential question, unless respondents were behaving strategically—reporting a value higher than their true values to ensure the provision of the FAW standard (public good). This paper combines the WTP values elicited using this approach with the dietary and FAW

² Focusing providing additional contact for dams and their calves.

regulatory preference information to evaluate the differences in valuation between dietary groups and within regulatory categories.

People's stated choice are not always aligned with their actions. This remains a challenge for preference elicitation using survey instruments. Consistent with the standard practice in the literature (e.g., Lusk 2003), the stated preference section of the survey instrument used for the data collection was preceded by a "cheap talk" script asking respondents to consider their choices as real-world choices with cost implications.

Information on sociodemographic characteristics including age, income, place of residence, gender, education, household size and number of children in the household was also collected. This is in addition to respondents' human values and animal attitude scores.

Measuring human values: the schwartz value scale

Human values were measured with the Schwartz value statements (Schwartz 2012). Respondents were presented with the 10-item Schwartz value scale (supplementary material A Table S2) and asked to rate the relevant value statements on an 8-point scale with endpoints ("0" - "opposed go my values") - ("8" - "of supreme importance"). A principal component analysis (PCA) approach was used to generate the meta-values included in the analysis. Consistent with the Schwartz values framework, the PCA analysis yielded four factors denoting the four meta-values (supplementary material A Table S1). Namely: Self-enhancement which includes items such as achievement; self-transcendence which includes items such as universalism benevolence; Openness to change (e.g., item and simulation); and, Conservation (items, e.g., tradition and security). (Schwartz 2012; Caracciolo et al. 2016).

Measuring attitudes toward animals: the animal attitude scale

Data on respondents' animal attitudes were elicited using the animal's attitude scale (AAS) (Herzog et al. 2015). The scale has been applied in many contexts (e.g., Ruby 2012) to measure attitudes toward the use of animals. The present study applied the 5-item version of the scale (supplementary material A Table S3). Herzog et al. (2015) found the 5-item version to be psychometrically robust and highly correlated with the original 20-item scale. Individual scores are generated as the means of their ratings of the 5 items of the scale.

Empirical strategy

The empirical strategy employed in this study follows two steps. Firstly, a multivariate logistic analysis is performed to evaluate preferences for different FAW regulatory mechanisms. This approach is well-suited for the present analysis considering the dichotomous nature of regulatory preference indicator (Greene 2014). A respondent is assigned 1, for selecting a particular regulatory mechanism as most preferred, zero otherwise. Given a set of FAW regulatory mechanisms ($j = 1, 2, \dots, 4$), the i th individual's latent preference RM_{ij}^* is unobserved such that:

Table 1 Descriptive statistics of variables included in the analysis

Variable	Obs	Mean	Std. Dev	Min	Max
<i>Socio-demographics characteristics</i>					
city	1020	0.51	0.50	0	1
income	1020	66,841	37,490	20,000	125,000
female	1020	0.49	0.50	0	1
age	1020	47.25	17.28	18	90
Household size	1020	2.87	1.45	1	6
Children < 18yrs	1020	0.83	1.15	0	5
university	1020	0.39	0.49	0	1
<i>Regulatory preferences</i>					
market	1020	0.46	0.50	0	1
positive donation	1020	0.18	0.38	0	1
antagonistic	1020	0.11	0.32	0	1
political	1020	0.25	0.43	0	1
<i>Dietary preferences</i>					
omnivores	1020	0.71	0.45	0	1
flexitarian	1020	0.11	0.32	0	1
vegetarian	1020	0.08	0.28	0	1
vegan	1020	0.05	0.21	0	1
pescatarian	1020	0.03	0.16	0	1
other	1020	0.02	0.13	0	1
<i>Animal attitudes</i>					
animal attitude scale	1020	3.61	0.59	1	5
<i>Human values</i>					
openness to change	1020	4.07	2.17	0	8
self-transcendence	1020	4.67	2.42	0	8
conservation	1020	4.51	2.35	0	8
self-enhancement	1020	3.81	2.34	0	8

market refers to private (voluntary) mechanisms, *positive donation* refers to donations to animal welfare not-for-profits campaigning for higher standards on conventional farms, *antagonistic* refers to donations to animal rights groups campaigning against conventional farming and *political* refers to preference for government mandated farm animal welfare standards

$$\begin{aligned} RM_{ij} &= 1 \text{ if } RM_{ij}^* > 0, \\ RM_{ij} &= 0 \text{ if } RM_{ij}^* \leq 0 \end{aligned} \quad (1)$$

The resulting probability (**P**) is given as:

$$P(RM_{ij} = 1|X) = P(\beta_0 + \beta_1 X + \beta_2 X + \dots + \beta_n X + \varepsilon_{ij} > 0) \quad (2)$$

where X is a set of factors including human values, animal attitudes, dietary preferences and sociodemographic factors, and β s are coefficient estimates. After estimating the coefficient estimates, the marginal effects are computed and reported. The analyses are conducted in STATA 18 software (Stata-Corp LP, College Station USA).

The second set of analysis applies a nonparametric approach to examine the differences in willingness to pay across the main dietary categories using data from a contingent valuation experiment. Specifically, mean WTPs under market and

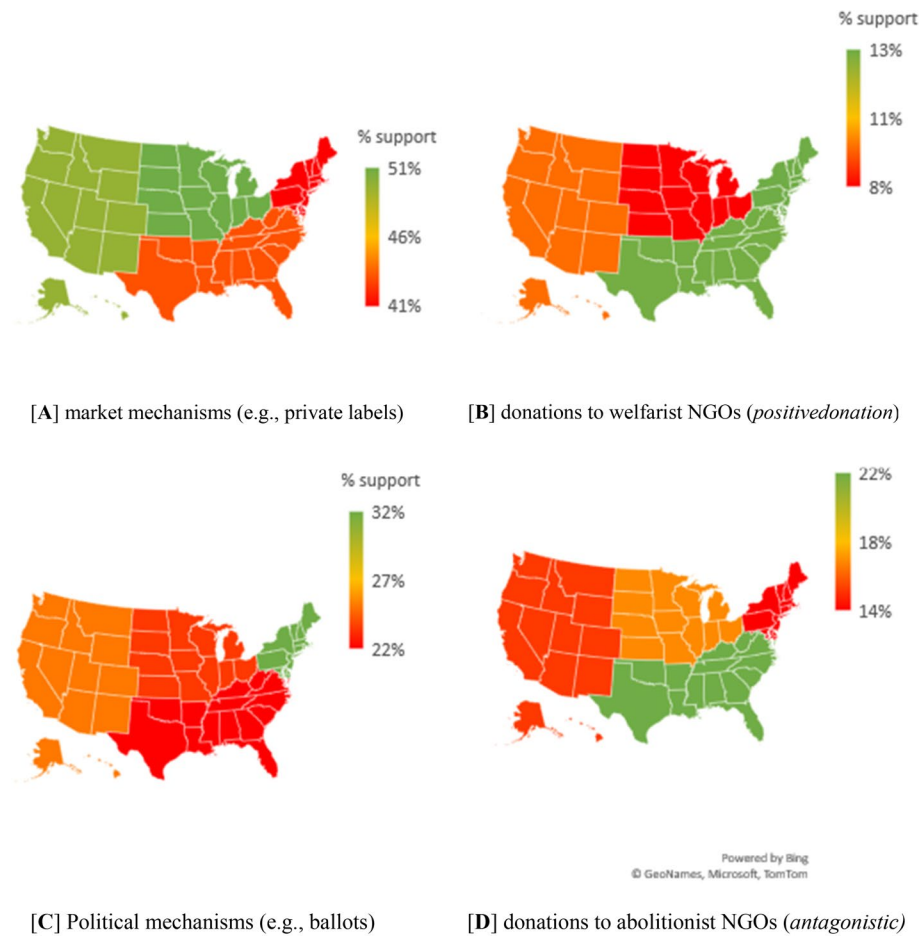


Fig. 1 Spatial distribution in preferences for different regulatory mechanisms across four US regions (South, Northeast, Midwest, West)

political regulatory scenarios are estimated and compared for the four dietary categories (vegans, vegetarians, flexitarians, and omnivores) examined in this study.

Results

Table 1 shows the overview of the variables included in the analysis. The average household income of respondents is approximately \$67,000 with about 40% of the sample having attained university education. Approximately, 50% of the respondents reported living in cities. The sample respondents consist of 49% female and 51% male. The average household size is 3. Most households have at least one child (< 18 years old).

The data shows that 71% of respondents are omnivores (see Table 1). Flexitarians represent 11% of the sample as compared to vegans (5%) and vegetarians (8%). Pescatarians and other dietary categories make up the remaining 5%. This distribution of dietary preferences is generally consistent with available data in the US (see for example, Pew Research (2016)).

The descriptive overview of the data also reveals that most respondents (46%) prefer market-based FAW measures (see Table 1). This is followed by mandated standards through political mechanisms (25%) and donations to charities advocating for improved

welfare standards on conventional farms (18%). Support for charities opposed to conventional farming was the least preferred mechanism (11%) for changing FAW standards.

The preferences for the different policy mechanism showed variation across four regions of the US – South, Northeast, Midwest and West. Figure 1 is a spatial graph showing differences in the preferences for the different mechanisms by region. It is evident from the Figure that support for market mechanisms is highest in the Midwest (51%) and lowest (41%) in the Northeast (e.g., Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Vermont). Conversely, respondents in the Northeast most preferred (32%) political mandates for regulating FAW compared to 22% in the South and 24% in the Midwest. This dichotomy between the Midwest and Northeast, for example, may reflect differences in liberal–conservative and independence-social ideologies between the two regions (Pew Research Center 2014a, 2014b). Additionally, The Midwestern states (e.g., Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin) have a large and robust agricultural industry (USDA 2024). Out of the states with existing state-level legislations, 5 states (45%) in the Northeast currently have FAW bills and ballot initiatives as compared to 2 states (17%) in the Midwest (Animal Welfare Institute 2024). Pertaining to the support for advocacy groups, respondents in the South (13%) and Northeast (13%) favor donations to welfarist NGOs. Respondents in the South (22%) also most prefer donating to NGOs opposed to conventional livestock production (antagonistic) among the list of regulatory mechanisms. Support for these NGOs was least preferred in the Northeast (14%).

Dietary choice and policy preferences

Table 2 is a summary of the coefficient estimates of the multivariate logit regressions. Consistent with the objective of the present study, the question of interest is simple. Do respondents in particular dietary preference groups exhibit a higher propensity for choosing specific FAW policies? The study reports the base model estimates for each FAW policy preference category (1–4) as well as the full model which accounts for human values (5–8). From the base estimates (1–4) animal attitudes influences the support for political and market-based mechanisms. Preference for political mechanisms and donation to abolitionist NGOs differ among vegans and omnivores. The results also show significant variation in preferences for regulatory mechanisms by residence (city), gender (female) and age. The rest of the discussion in this section focuses on the full model (5–8).

The results (Table 2, Eqs. 5–8) indicate that omnivores are less likely to support animal rights groups campaigning against conventional farming (*antagonistic*). Vegans on the other hand, are more likely to support government mandated FAW standards (*political*). Market-based FAW policies are less favored by urban dwellers, females, and respondents with higher animal attitude scores.

The results also highlight important differences in FAW regulatory preferences relative to respondents' demography. This is evidenced by the: urban- non-urban, generational and gender divides in regulatory preferences. Older (versus younger) respondents are more likely to support market mechanisms. They are, however, less likely to support advocacy by not-for-profits to improve FAW standards. Conversely, females and urban respondents prefer more stringent regulatory mechanisms and show higher levels of

Table 2 Coefficient estimates for the multinomial logit estimation (dependent variable = policy choice (1/0))

	(1) Market	(2) Political	(3) Antagonistic	(4) Positive donation	(5) Market	(6) Political	(7) Antagonistic	(8) Positive
<i>Donation</i>								
City	−0.28* (0.14)	0.27* (0.16)	−0.20 (0.22)	0.25 (0.18)	−0.26* (0.14)	0.28* (0.16)	−0.22 (0.22)	0.21 (0.18)
Income	<0.001* (0.00)	−0.00 (0.00)	−0.00 (0.00)	−0.00 (0.00)	<0.001* (0.00)	−0.00 (0.00)	−0.00 (0.00)	−0.00 (0.00)
Female	−0.25* (0.14)	0.07 (0.16)	−0.13 (0.22)	0.41** (0.18)	−0.30** (0.15)	0.06 (0.16)	−0.06 (0.23)	0.43** (0.19)
Age	0.02*** (0.00)	−0.01 (0.01)	−0.03*** (0.01)	−0.01** (0.01)	0.02*** (0.00)	0.00 (0.01)	−0.03*** (0.01)	−0.01** (0.01)
Household size	−0.06 (0.06)	0.00 (0.07)	0.10 (0.09)	0.02 (0.08)	−0.05 (0.06)	−0.01 (0.07)	0.13 (0.09)	0.03 (0.08)
Children < 18yrs	−0.11 (0.08)	0.06 (0.09)	0.02 (0.11)	0.06 (0.10)	−0.10 (0.09)	0.07 (0.09)	−0.01 (0.11)	0.04 (0.10)
University	0.01 (0.18)	0.04 (0.20)	−0.32 (0.27)	0.16 (0.22)	0.07 (0.18)	−0.01 (0.20)	−0.32 (0.27)	0.16 (0.22)
<i>Animal attitudes</i>								
Animal attitude scale	−0.28** (0.12)	0.27** (0.13)	−0.07 (0.17)	0.14 (0.14)	−0.23* (0.12)	0.15 (0.13)	0.02 (0.18)	0.14 (0.15)
<i>Dietary Preferences</i>								
Omnivores	0.63 (0.55)	0.86 (0.76)	−1.14** (0.56)	−0.55 (0.55)	0.55 (0.55)	0.94 (0.77)	−1.06* (0.57)	−0.55 (0.55)
Flexitarian	−0.03 (0.58)	0.95 (0.79)	−0.45 (0.61)	−0.21 (0.59)	−0.09 (0.59)	1.06 (0.79)	−0.42 (0.61)	−0.23 (0.59)
Vegetarian	0.62 (0.60)	0.97 (0.80)	−1.05 (0.67)	−0.66 (0.62)	0.58 (0.60)	1.03 (0.81)	−1.03 (0.67)	−0.68 (0.63)
Vegan	−0.20 (0.65)	1.37* (0.82)	−0.54 (0.67)	−0.61 (0.66)	−0.27 (0.66)	1.51* (0.82)	−0.61 (0.68)	−0.62 (0.67)
Pescatarian	0.29 (0.69)	0.45 (0.91)	−0.25 (0.73)	−0.34 (0.72)	0.21 (0.70)	0.58 (0.92)	−0.32 (0.74)	−0.34 (0.72)
<i>Human values</i>								
Openness to change					−0.16** (0.06)	0.14* (0.07)	0.19* (0.10)	−0.05 (0.08)
Self-transcendence					0.03 (0.05)	0.10* (0.06)	−0.17** (0.08)	−0.07 (0.07)
Conservation					0.12** (0.06)	−0.14** (0.06)	−0.13 (0.09)	0.06 (0.07)
Self-enhancement					−0.09* (0.05)	0.03 (0.06)	0.05 (0.09)	0.08 (0.07)
Constant	−0.56 (0.74)	−2.91*** (0.95)	0.65 (0.93)	−1.20 (0.83)	−0.16 (0.75)	−3.29*** (0.96)	0.39 (0.94)	−1.24 (0.84)
Observations	1020	1020	1020	1020	1020	1020	1020	1020
Pseudo R ²	0.07	0.02	0.06	0.03	0.09	0.03	0.07	0.03

Standard errors are in parentheses; *** $p < .01$, ** $p < .05$, * $p < .1$

support for political mechanisms as compared to market mechanisms. Females are also more likely to donate to charities campaigning for improved FAW standards on conventional farms; while, younger respondents are less likely to support these groups. Age is also inversely associated with support for groups advocating for the abolishment of conventional farming practices. This is indicative of higher levels of support for these groups among younger segments of the public. Support for market-based policies is also high among higher income households.

Pertaining to human values, Openness to Change and Self-enhancement values are negatively associated with preferences for market policies to regulate FAW. Respondents with higher Conservation value scores are more likely to support market-based FAW policies. The relationship between these values and preferences for political mandates is opposite to that for market mechanisms. An Openness to Change value orientation positively impacts the likelihood of supporting political mandates while Conservation has the opposite effect. The Self-transcendence value has a negative effect on the probability of donating to charities with an antagonistic view toward conventional farming. Respondents who support advocacy efforts by charities campaigning against conventional farming as the mechanism to improve FAW are more Open to Change.

The marginal effects reported in Table 3 capture the size of the effect of each factor on the likelihood of choosing the FAW regulatory mechanism under consideration. For market-based policies, location of residence (city), gender (female) and attitudes toward animals as measured by the AAS (Herzog et al. 2015) had the largest effect ($ME=0.06$). This is followed by the relevant human values, i.e., Openness to change ($ME=-0.03$) and self-enhancement ($ME=-0.02$). Dietary choice (vegan) is the most important driver ($ME=0.27$) of preferences for political mandates among the set of factors considered. Other important factors were location of residence and human values. Relative to the preference for market-based policy, the effect of the Openness to change meta-value has a moderately lower effect on the preference for political mandates. Dietary choice (omnivores) has a strong negative effect ($ME=-0.10$) on the likelihood of supporting charities opposed to conventional farming practices. Openness to change ($ME=0.02$) and Self-transcendence ($ME=-0.02$) had identical but opposite effects on the support for antagonistic groups. In comparison with human values and dietary choice, age has a marginal effect ($ME < 0.001$). A similar effect of age is observed in the case of the support for charities campaigning for higher FAW standards on conventional farms. However, most of the variability ($ME=0.06$) resulting from the set of factors considered in this case is due to gender (female).

Assessment of strategic behavior

Finally, this study addresses the second research question, i.e., the assessment of potential strategic behavior within the dietary categories with respect to preferences for different FAW policies. This analysis is preceded by the assessment of average WTP for more ethically produced milk by FAW regulatory preference categories. The WTPs are obtained from the open-ended CV experiment (see Fig. 2). As evident from the Figure, WTP for milk is highest among respondents who support charities campaigning against conventional farming practices (*antagonistic*). This segment of respondents' WTP is 60% more for milk every week. This is in comparison with the

Table 3 Estimates of marginal effects

	(1) Market	(2) Political	(3) Antagonistic	(4) Positive donation	(5) Market	(6) Political	(7) Antagonistic	(8) Positive donation
City	−0.06** (0.03)	0.05* (0.03)	−0.02 (0.02)	0.03 (0.03)	−0.06* (0.03)	0.05* (0.03)	−0.02 (0.02)	0.03 (0.03)
Income	0.00* (0.00)	−0.00 (0.00)	−0.00 (0.00)	−0.00 (0.00)	<0.001* (0.00)	−0.00 (0.00)	−0.00 (0.00)	−0.00 (0.00)
Female	−0.06* (0.03)	0.01 (0.03)	−0.01 (0.02)	0.06** (0.03)	−0.06** (0.03)	0.01 (0.03)	−0.01 (0.02)	0.06** (0.03)
Age	0.01*** (0.00)	−0.00 (0.00)	<−0.001*** (0.00)	<−0.001** (0.00)	0.00 (0.00)	0.00 (0.00)	<−0.001*** (0.00)	<−0.001** (0.00)
Household size	−0.01 (0.01)	0.00 (0.01)	0.01 (0.01)	0.00 (0.01)	−0.00 (0.01)	−0.00 (0.01)	0.01 (0.01)	0.00 (0.01)
Chil- dren < 18yrs	−0.03 (0.02)	0.01 (0.02)	0.00 (0.01)	0.01 (0.01)	−0.02 (0.02)	0.01 (0.02)	−0.01 (0.01)	0.01 (0.01)
University	0.00 (0.04)	0.01 (0.04)	−0.03 (0.03)	0.02 (0.03)	0.02 (0.04)	−0.00 (0.04)	−0.03 (0.03)	0.02 (0.03)
<i>Animal attitudes</i>								
Animal atti- tude scale	−0.06** (0.03)	0.05** (0.02)	−0.01 (0.02)	0.02 (0.02)	−0.05* (0.03)	0.03 (0.02)	0.00 (0.02)	0.02 (0.02)
<i>Dietary Preferences</i>								
Omnivores	0.14 (0.12)	0.16 (0.14)	−0.11** (0.05)	−0.08 (0.08)	0.12 (0.12)	0.17 (0.14)	−0.10** (0.54)	−0.08 (0.08)
Flexitarian	−0.01 (0.13)	0.17 (0.14)	−0.04 (0.06)	−0.03 (0.08)	−0.02 (0.13)	0.19 (0.14)	−0.04 (0.06)	−0.03 (0.08)
Vegetarian	0.14 (0.13)	0.18 (0.15)	−0.10 (0.06)	−0.09 (0.09)	0.13 (0.13)	0.19 (0.14)	−0.10 (0.06)	−0.10 (0.09)
Vegan	−0.04 (0.15)	0.25* (0.15)	−0.05 (0.06)	−0.09 (0.09)	−0.06 (0.14)	0.27* (0.15)	−0.06 (0.06)	−0.09 (0.09)
Pescatarian	0.06 (0.15)	0.08 (0.17)	−0.02 (0.07)	−0.05 (0.10)	0.05 (0.15)	0.10 (0.17)	−0.03 (0.07)	−0.05 (0.10)
<i>Human values</i>								
Openness to change					−0.03** (0.01)	0.02* (0.01)	0.02* (0.01)	−0.01 (0.01)
Self-tran- scendence					0.01 (0.01)	0.02* (0.01)	−0.02** (0.01)	−0.01 (0.01)
Conservation					0.03** (0.01)	−0.02** (0.01)	−0.01 (0.01)	0.01 (0.01)
Self-enhance- ment					−0.02* (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)
Constant	−0.56 (0.74)	−2.91*** (0.95)	0.65 (0.93)	−1.20 (0.83)	−0.16 (0.75)	−3.29*** (0.96)	0.39 (0.94)	−1.24 (0.84)
Observations	1020	1020	1020	1020	1020	1020	1020	1020
Pseudo R ²	0.07	0.02	0.06	0.03	0.09	0.03	0.07	0.03

Standard errors are in parentheses; *** $p < .01$, ** $p < .05$, * $p < .1$

segment which favors market-based policies (WTP of 54% more for milk) which is the lower bound of the WTP distribution. Segments of the public who prefer political mechanisms such as voting as the approach to increasing FAW standards are WTP 59% more for milk. Respondents who support donations to charities campaigning for higher standards within conventional production systems had a WTP of 57% (*positive donation*).

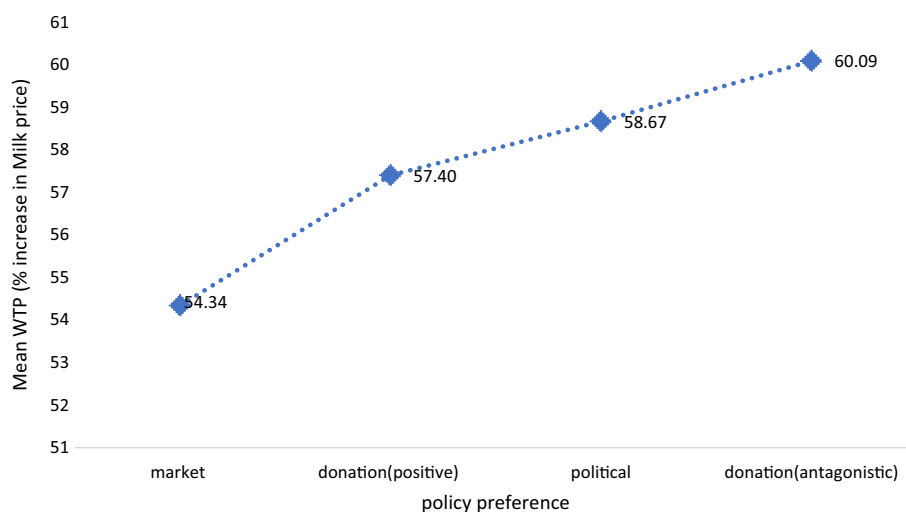


Fig. 2 Distribution of average WTP for ethically produced milk by policy preference category

Combining the dietary and FAW regulatory preference data with the results of the OE consequential CV experiment WTP estimates allows for the assessment of possible strategic behavior. For each dietary category, mean WTP within the market and political policy preference groups are compared. The comparison is done for the OE and the consequential questions. With respect to the latter question, respondents were asked to state how much they were WTP before they felt that they were paying too much for what the product was really worth to them. All other factors held constant; it is expected that WTP under the consequential scenario should not be exceeded by the OE unless a respondent is behaving strategically. Two critical observations are evident from the results of the analysis presented in Fig. 3. First, in general, average WTP by segments of the public who prefer political mechanisms exceeds those who prefer market mechanisms. The notable exception is the case of vegans. Vegans who prefer market policies expressed a higher WTP as compared to those who prefer mandates. This outcome is particularly insightful considering that vegans by virtue of their dietary choice are non-participants in the market for FAW products. This may be indicative of a desire to impose additional costs on segments of the market that purchase/consume livestock products.

Second, for flexitarians and omnivores, the average WTP as derived from the OE CV question was lower than true value (upper limit) WTP revealed through the follow-up consequential question. Vegetarians with a preference for market-based policies reported marginally higher WTP (0.4%) relative to their own perceived true value of the product under consideration. The tendency to behave strategically was more persistent for vegans—WTP exceeded true values by about 1% (market) and 1.22% (political).

Discussion

Given the potentially large economic impacts of FAW standards, the analysis presented in this paper is relevant to the discourse on effective FAW policy design. This is with respect to an under-researched area in the literature, i.e., the incorporation of dietary

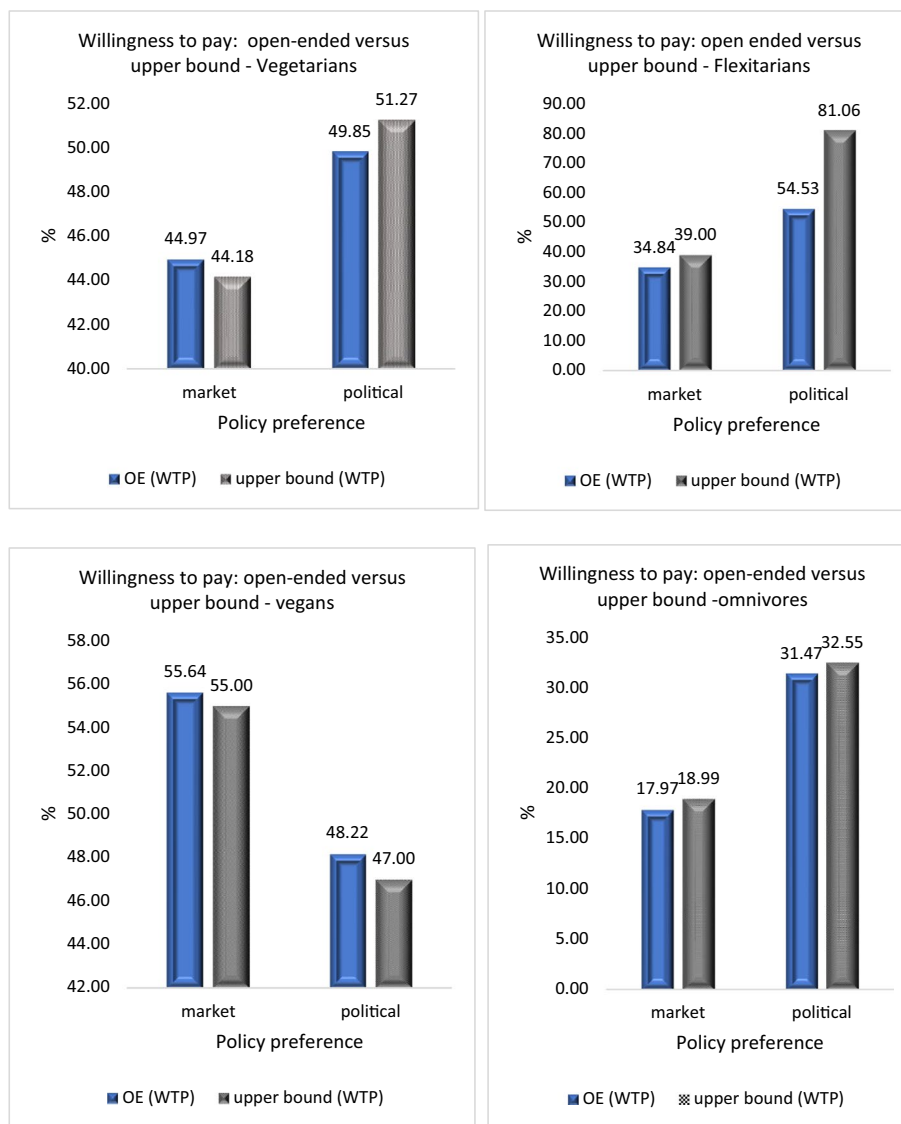


Fig. 3 Comparison of average WTP for market and political policy preferences across dietary groups

choice into policy decision-making frameworks. Several policy deductions can be made from the present analysis. The results provide some validity to the original hypothesis of the study, i.e., segments of the public with certain dietary preferences exhibit specific proclivities for particular FAW policy options. Anecdotal evidence may indicate that some dietary groups as result of their non-participation in certain mechanisms may be exempted from certain policy frameworks. However, this is not simplistic given the portfolio of options (e.g., market, political, and advocacy) available to the public and the possible impact (e.g., at farm or retail level) of the actions of different stakeholders. The study considered both market and political regulatory mechanisms as well as indirect channels such as support for not-for-profit advocacy. The results show that vegans (5% of the sample) are more likely to support politically based mechanisms such as mandates and regulations as compared to non-vegans. This result is consistent with exclusion of

vegans from direct participation in the market for FAW products and the prominent role of animal welfare in the shift to meat-free diets (Beck and Ladwig 2021). High(er) animal attitudes scores are also associated with a lower preference for market-based policies. Considering the voluntary nature of market regulation and the lack of universal compliance on the supply-side, it is not surprising that respondents with higher animal attitudes tend not to support market mechanisms. Higher animal attitudes are associated with a greater concern for the welfare and protection of animals (Herzog et al. 2015).

Omnivores (71% of the sample) are less likely to support animal rights group campaigning for the abolishment of conventional farming practices. The urban–non-urban divide and emerging generational differences in the preferences for ethical standards in food choice appear to impact FAW policy preferences (Clark et al. 2016; Howard and Allen 2010). For example, the findings indicate that urban consumers are less likely to support market-based policies. Conversely, they tend to support political mandates. Approximately 40% of respondents living in urban areas (cities) preferred market-based measures as compared to 52% in non-urban areas. This dichotomy is not surprising considering the stronger connection of the latter to the agrarian economy and the cost implications of stringent FAW standards on rural communities. Farm animal welfare standards implemented through regulations and referendums often impose significant costs on producers. Norwood and Lusk (2011) reported a decline in producer surplus of US\$187.3 million from converting to cage-free eggs. Previous studies (e.g., Mullally and Lusk 2018) reported significant reductions in eggs and the number of laying hens with the implementation of stricter regulation. It is evident from the analysis that females and younger respondents show lower levels of support for market policies. They tend to prefer more restrictive policy alternatives (political) or advocacy efforts. These generational and gender disparities reflect differences in preferences for FAW standards (Boaitey and Minegishi 2020). This finding has major implications for market-led initiatives for improving FAW standards particularly considering the importance of this segment of the market in food retail. An increasing number of large retailers have launched private FAW labeling schemes to address increasing demand for improved FAW food standards (Casey 2023). The implication of this outcome is that this segment of the public may not consider market mechanisms sufficiently effective in improving FAW standards. Thus, retailers may face a higher quality assurance burden requiring the use of third-party assurance schemes such as the Global Animal Partnership (GAP) labeling programs. This is in contrast to mandated standards which require uniform compliance by farmers supplying a product in a particular jurisdiction.

The differences in consumer valuation reported under market and political regulatory mechanisms is consistent with the consumer–citizen duality (Frank 2018; Uehleke and Huttel 2022; Jiang et al. 2024). This suggests the public in their role as citizens may not fully internalize the cost of their decision-making as opposed to consumers (Harvey and Carmen 2013). The study also extends the generalized results of Lai et al. (2022) by showing that the over-signaling of values may be more persistent among some segments of the population who may not incur the higher cost associated with higher FAW standards. This finding provides suggestive evidence of strategic behavior by specific dietary categories. Vegans not only signaled a valuation greater than the true perceived value of the product, but they were the only dietary cohort with a higher WTP in the market

versus political policy preference sub-categories. The implication is that vegans may overstate their preferences for high FAW standards in referendums or markets through activism. Although, the WTPs reported in this study are generally higher than those reported in other WTP for milk FAW attributes in the US (e.g., Bir et al. 2021, 2019). The cited studies used choice experiment (CE) approach; while, the present study used an open-ended contingent valuation (CV) approach. Among the set of approaches used for hypothetical elicitation of values of sustainable food attributes, WTP estimates in CV tend to be higher than in CE (Li and Kallas 2021).

The results further indicate that FAW policy preferences are anchored in higher order value orientations as measured by the Schwartz value statements (Schwartz 2012). The policy preferences are situated within the change–conservation, enhancement–transcendence value spectrums. Openness to change is negatively associated with support for market-based policies. In contrast, it is positively associated with preferences for mandates (political) and support for charities opposed to conventional farming practices (antagonistic). This meta-value is associated with independence and readiness to change (Schwartz 2012; Caracciolo et al. 2016). Considering that market mechanisms represent the status quo or the least disruptive approach to improving FAW standards, the negative association with Openness to change is not surprising. Conversely, the positive association with the support for the political process and antagonistic groups is consistent with this value orientation. This is particularly true considering that politically mandated standards often have disruptive structural impacts on food supply chains. This is due to the requirement that, for example, production practices at the farm level are modified to meet mandated standards (Ochs et al. 2019). Self-transcendence has no significant effect on preferences for market FAW policies. It is, however, positively associated with the support for political mandates and negatively associated with support for antagonistic groups. Self-transcendence captures the concern for others and their wellbeing (Abrahamse 2019). The effect of the self-transcendence value appears to be highlighting the tension between concern for animals and the wellbeing of farmers. On the one hand, this value emphasizes higher animal welfare through the preference for political mandates while at the same time opposing the abolishment of animal agriculture. This is consistent with the observed negative effect in the support for antagonistic groups.

The findings further show that Conservation is associated with the support for market-based mechanisms. This value emphasizes resistance to change and maintenance of the status quo (past) (Schwartz 2012). Compared to mandates, mechanisms such as private labels preserve individuals' ability to choose their own product preferences without the forced conformity of mandated standards. Self-enhancement, the meta-value that emphasizes self-interest and dominance over others (Caracciolo et al. 2016) is negatively associated with preferences for market-based policies. This corroborates the evidence of preference for independence of choice and flexibility identified previously. In summary, these results indicate that preference for market-based policies are embedded in the values emphasizing independence and preservation of the status quo. In contrast, more stringent policy preferences such as mandates and disruptive changes in conventional farming practices are mostly driven by a desire for change and lack of conformity to status quo standards. The findings on regulatory preferences are consistent with the relevant studies on the preferences for FAW political initiatives reported in the literature

(Smithson et al. 2014; Bovay and Summer 2019; Hopkins et al. 2022). The present findings however suggest that the identified role of ideological differences is imbedded in higher order value orientations.

Conclusion

Establishing an effective policy framework for farm animal welfare that achieves the twin goals of improved animal welfare without imposing an excessive cost burden on the public is a critical issue. While different sources of heterogeneity have been analyzed, the relationship between dietary preference categories and the tendency to support particular FAW policy mechanisms remains unexplored. Specifically, this paper evaluated the relationship between different dietary preferences and FAW policy choices. The paper also investigated the possibility of strategic behavior among specific dietary preference categories and whether policy preferences are embedded within higher value orientations as measured by the SVS. This paper provides evidence that heterogeneity due to dietary choice is relevant in the understanding of the variation in the support for different FAW policies. The paper finds a tendency among segments of the public who do not consume livestock products to support more restrictive FAW policy mechanisms. This segment is more likely to state higher values for FAW standards and behave strategically. The effect of different human value orientations differs significantly among the different policy options. Market policies more aligned with Conservation values; while, non-market policy preferences are associated with Openness to change and self-centered orientations. Consideration must be given to the dominance of specific value orientations in certain jurisdictions in the implementation of FAW standards. If the same policy objective (i.e., higher FAW standards) can be achieved irrespective of process (market versus non-market), then a consideration for value orientation can facilitate widespread support for a particular policy option.

The findings of this study have critical implications for US FAW policy considering the fact that FAW regulation is likely to be dominated by state-level legislation into the foreseeable future. Perhaps the most significant being that, differences in value motivations across States is likely to drive the wedge in FAW standards. The implication of this is the potential differences in stringency across States and the creation of low welfare FAW havens (Grethe 2017) within the US. This can have consequences for interstate commerce and the distribution of the social costs associated with more stringent regulation (Lee et al. 2023; Carter et al. 2021). The finding that non-meat consumers favor political mechanism implies that as this segment of consumers grow in the US, the FAW policy landscape may shift away from voluntary standards to mandates. While the public generally care about the wellbeing of animals, the question for policymakers is what represents the socially acceptable level of standards. An additional consideration is mitigating the welfare cost of prohibitively high standards and avoiding unfunded mandates (Sumner et al. 2008).

The findings of this paper also have implications for FAW welfare policy beyond the US. For example, England's Department for Environment, Food and Rural Affairs (DEFRA) has begun consultations on a new FAW labeling scheme (DEFRA 2024). Recent proposed changes to the European Union (EU)'s agricultural policies have led to major confrontation between farmers and policymakers across Europe. Concerns

relate to the costs of these regulations and their impact on the competitiveness on farmers who have to comply with stricter standards versus others outside the EU who face lower standards (Martin 2024). Specific to FAW, new proposals under the farm-to-fork policy seeks to broaden the scope of current regulation and enforce higher standards using market and non-market mechanisms (European Commission 2024). Although Public polls in the EU have consistently showed overwhelming support for higher FAW standards, purchase intentions remain weak. About 90% of respondents in a recent Eurobarometer survey support improved FAW, 37% were not willing to pay more (Eurobarometer 2023). It is therefore imperative in light of the findings reported in this study for policymakers to be mindful of the complexities in implementing FAW standards that addresses societal demands and the heterogeneity in the underlying motivations. This is particularly important considering that most of the mandated standards target the production of common food products. Policy may also develop creative co-governance standards where public policy sets the *de minimis* FAW policy standards complemented by private sector initiatives. Consideration must also be given to the regional differences in human value orientations in determining the optimal policy mix (market versus non-market). Widespread development and implementation of retailer-led initiatives that raise FAW standards while preserving individual choice may be the optimal approach in regions opposed to stricter government regulation. The upstream cost impacts on farmers of this graded policy approach can however, be significant.

This study has a number of limitations. The study did not assess the impact of existing regulations such as mandates on dietary preferences. In fact, it is plausible that existing FAW regulations and public awareness of these measures could influence dietary choices. Examining this issue in the US and other countries represents a critical area of future inquiry. Also, the main context of the study was animal welfare and other motivations of dietary choice such as health concerns were not accounted for. It possible that respondents who do not consume milk because of lactose intolerance, for example, may express different preferences from those whose motivations are purely ethical. Recent studies (e.g., De Groeve et al. 2022) point to differences in commitment between animal ethics vegans versus health vegans. These differences are not explored in this study. This paper also does not account for potential preference complementarities in regulatory options. Are preferences for market-oriented advocacy initiatives different from politically oriented ones, for example? Future work can consider these complementarities. This is in addition to the role of institutional (e.g., government, food retailers, not-for-profits, etc.) trust on FAW regulatory preferences. Consistent with the distribution of dietary preferences in the US, vegans and vegetarians represent a relatively small sample of the data; hence, the scale of their effects may be inflated relative to that of omnivores. Future studies can compare equal sample sizes of the dietary preference categories to reduce the potential scale effects. Additional research is also needed to understand the subtleties of respondents' viewpoints and to untangle potential conflicts in human values. This requires a qualitative or mixed methods approach and would represent a useful extension to the present work.

Abbreviation

FAW Farm animal welfare

Supplementary Information

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Supplementary Material 1.

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Author contributions

AB conceptualized the study, designed the survey, performed the statistical analysis, and wrote the manuscript.

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Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Competing interests

The authors declare they have no competing interests.

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