



Consumer attitudes towards farm animal welfare in Argentina, Chile, Colombia, Ecuador, Peru and Bolivia: A segmentation-based study

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ABSTRACT

Consumer attitudes towards farm animal welfare (FAW) are not a one-dimensional phenomenon; they entail various attitudinal and social dimensions related to ethnicity, agri-food culture, ethics, purchasing power and beliefs. Therefore, the study aimed to identify segments of South American consumers of animal products according to their attitudes towards FAW. An online survey was carried out among participants from Argentina, Chile, Colombia, Ecuador, Peru and Bolivia ($n = 2852$). A factor analysis followed by a hierarchical cluster analysis identified four consumers' segments based on their attitudes towards FAW. The first corresponds to consumers ethically committed to FAW ($n = 1323$), the second to those committed to farmers and interested in labels ($n = 215$), the third to consumers interested in FAW and farmers and their efforts towards FAW ($n = 993$), and the fourth, associated with apathetic consumers ($n = 321$). Although FAW is a relatively new commercial phenomenon in South America, our results showed that concern for animals may be a universal human value, which can overcome traditional dichotomies between rich-poor or developed-undeveloped countries.

1. Introduction

Food security and sustainability are paramount goals of global policy in the Twenty-First Century; which are inextricably linked in the analysis of animal production (Appleby & Mitchell, 2018). Animal welfare is a crucial element for the sustainability of the agri-food industry and is a term used to express ethical concerns about the quality of life experienced by animals, particularly those used by human beings to produce meat (Hansen & Østerås, 2019). Thus, farm animal welfare (FAW) and consumption at the global and regional levels receive significant attention in contemporary societies. Both concepts are addressed in daily debates among politicians, policymakers, academics, businesses, non-governmental organizations and citizens (Golob & Kronegger, 2019). Consequently, the reflection on production practices continues, given the need to respond to the concerns of consumers who are looking for more animal-friendly and sustainable products (Marchant-Forde & Boyle, 2020; Yang, 2020).

Diverse consumer and citizen perception studies worldwide have shown that attitudes to FAW are positive (Clark, Stewart, Panzone, Kyriazakis, & Frewer, 2016; Janssen, Busch, Rödiger, & Hamm, 2016). These results support the development of government regulations and

stakeholders policies and products (Van Riemsdijk, Ingenbleek, Van Trijp, & Van der Veen, 2017). However, most of these studies were performed in Europe and North America, yet, only a handful of studies have been carried out in Latin America (Clark et al., 2016). Though this has changed in the last five years, research is still limited to specific countries (e.g. Mexico) or animal products (e.g. dairy products) (Cardoso, von Keyserlingk, & Hotzel, 2017; de Queiroz et al., 2018; Miranda-de la Lama et al., 2017; Rucinke, Oliveira Souza, & Maiolino Molento, 2017; Vargas-Bello-Pérez, Riveros, Köbrich, Álvarez-Melo, & Lensink, 2017). Then, it remains necessary to understand consumers attitudes based on individual characteristics and behaviors (Vecchio & Annunziata, 2012) that reflect the variety of cultures and economic contexts within the Latin America region.

Consumption preferences and behavior patterns regarding food are affected by several factors such as ethical beliefs and opinions, life-style, personality, knowledge, culture, socio-demographics, product quality, and price (Font-i-Furnols & Guerrero, 2014). As factors can differ across consumer segments, not all individuals will pay equal attention to sustainability-related issues when considering their consumption choices (Golob & Kronegger, 2019). Consumer segmentation analysis, a tool used in market research, groups individuals based

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on common characteristics, preferences or desires (Vecchio & Annunziata, 2012). Consumer segmentation analysis could provide information to different stakeholders to formulate strategies that can support better animal welfare practices and identify market opportunities based on consumer needs (Di Pasquale et al., 2016; Janssen, Busch, et al., 2016). A meta-analysis study found that studies applying segmentation analysis based on animal welfare attitudes or preferences identified at least one segment or cluster of consumers who put great value on animal welfare friendly production practices (Janssen, Busch, et al., 2016). In Latin America, consumer segmentation has only been applied to Mexican consumers to explore the association between their animal welfare attitudes and willingness to pay for higher animal welfare products (Miranda-de la Lama et al., 2019).

The South American population is product of intense miscegenation between the native peoples (e.g. Caribs, Chibchas, Quechuas; Aymaraes, Araucanos, Tupies, Guaranies, Puelches) and the conquerors coming from the Iberian Peninsula. After the conquest, several waves of migrations arrived in the subcontinent, some of them forced by slavery, such as those coming from Africa, and others motivated by wars, famines and economic crises from Europe, the Middle East, China and Japan (Olsen, 2017). However, this intercultural mosaic is the essence of a series of commonalities among South Americans such as language, religion, legal system, culture and even agri-food customs (Lovera, 2005; S. Park, Hongu, & Daily, 2016).

Animal protein consumption in Latin America has increased in the past ten years (OECD/FAO, 2020), and is expected to continue growing at a rate of 1.8 g/day (OECD/FAO, 2021). This increment is driven by increased economic power, more significant investment in technology advancements, and animal production intensification (Fraser, 2008; OECD/FAO, 2020). However, increased production does not reflect changes in animal welfare legislation, particularly in South America, where a handful of countries may have adapted or will adapt their regulations due to increased export to European markets (Ghislain, 2018; World Animal Protection, 2013). For these reasons, it is essential to understand consumer attitudes and the different segments present in this region to assist other research, industry, and public policy makers to develop strategies that adjust to their society. This study aimed to identify segments of South American consumers according to their attitudes towards FAW, and to describe them by incorporating their socio-demographic characteristics and their level of agreement with measures aimed at improving FAW conditions. We hypothesize that consumers in our sample can be grouped in different segments according to their attitudes towards FAW, which are associated with sociodemographic characteristics such as age, sex, origin, or educational level of consumers, but are transversal to the countries studied.

2. Materials and methods

This cross-sectional study was based on an online survey conducted in six South American countries (Argentina, Chile, Colombia, Ecuador, Peru and Bolivia) through a Computer Assisted Web Interview (CAWI) from the 15th of July 2018 to the 13th of February 2019. The CAWI was a structured questionnaire focused on the attitudes and perceptions of consumers about FAW, based on Miranda-de la Lama et al. (2017) and Estévez-Moreno, María, Sepúlveda, Villarroel, and Miranda-de la Lama (2021). The CAWI was written in Spanish and designed as an online survey using Google Forms. Volunteer participants over 18 years of age were invited using snowball sampling methods that started with two sources: social networks (Facebook and Twitter) and researchers own networks (a link sent via email or WhatsApp). Additionally, volunteers were encouraged to share the survey link with their social networks to increase the total and diversity of participants, as carried by Tribst, Tramontt, and Baraldi (2021).

The survey was answered by 3207 people, of whom 232 were eliminated because they did not meet at least one of the following inclusion criteria: over 18 years old, submitted a fully answered survey,

and was not a resident in one of the six countries surveyed. The resulting sample of 2975 surveys was made of 85.2% of meat, milk and egg consumers, 10.7% of milk and/or egg consumers, and only 4.1% of vegans. Since this last group did not correspond to an animal protein consumer, vegans were excluded ($n = 123$) from the segmentation analysis, leaving a final sample of 2852 participants. This study was performed in compliance with the 1964 Helsinki Declaration guidelines (World Medical Association, 2013).

2.1. Survey structure

The questionnaire consisted of five sections. The first section informed the participants about the aim and duration of the survey, and that their answers to the survey were anonymized and voluntary. It also provided the contact details of the researchers in case the respondent had a question, and a yes-no question that respondent understood the statement above and agreed to take part of the study. If respondents said no to consent, this took them to a thank-you page. If respondents said yes, a second section opened asking about their demographic information (country of residence, sex, age group, highest education level, rural/urban origin, and animal protein consumption). In the third section, questions aimed to understand respondent's perceptions about five aspects relative to animal pain, emotions and fear (i.e. *Do you believe that farm animals should be able to express the natural behaviors of their species? Do you believe that farm animals should be free from fear and distress?*). The fourth section was about participants' concerns about FAW and their level of agreement with several measures to improve FAW conditions (i.e. *Do you believe that FAW should be taught in primary education? Do you believe that new laws are required to improve FAW?*). The fifth section was about the participants' perceptions on their own level of knowledge about FAW and about the availability of FAW information (i.e. *Do you believe that the current labels on products of animal origin allow for identification of farming and animal welfare conditions under which these were produced?*). All questions were measured on an ordinal five-point scale. For the specific statement '*What is your level of knowledge about the living conditions of farm animals?*' (Fifth section) response categories were: 1 = None, 2 = Low, 3 = Medium, 4 = High, and 5 = Very High. For the remaining questions of sections three to five the response categories were: 1 = surely not, 2 = probably not, 3 = it does not matter to me, 4 = probably yes, and 5 = definitely yes.

2.2. Statistical analysis

Statistical analyses were carried out using IBM SPSS Statistics for Windows, version 22.0 (IBM Corp., Armonk, N.Y., USA). Sociodemographic characteristics of respondents are presented as percentages. A factorial analysis was run to identify correlations and summarize the variables associated with FAW perception. A number of factors were obtained using the principal component extraction model, and only factors with eigenvalues higher than 1.0 were retained. The suitability of the data for structure detection was tested using the Kaiser Meyer Olkin Index (KMO) and Bartlett's test of sphericity. After the components were extracted, a varimax method of orthogonal rotation was carried out to better understand the factors. Finally, factors were named based on the variables they grouped (factor loadings >0.5) and used for cluster analysis. A hierarchical cluster analysis was performed to identify groups or profiles of consumers based on their attitudes towards FAW (the factors detected), using the Euclidean distance and Ward's method as the agglomeration criterion. This method provided internal homogeneity and intragroup heterogeneity criteria among groups, whose final number was defined based on the dendrogram. A new variable was created to relate each consumer with a specific cluster, and chi-squared and Kruskal-Wallis tests were used to test significant differences ($P < 0.05$) between clusters on a set of sociodemographic characteristics, including country of residence and the level of agreement with specific measures to improve FAW conditions.

3. Results

Of the total sample of consumers surveyed ($n = 2852$), the majority lived in Argentina (26.8%), Chile (20.4%) and Colombia (18.8%) (Table 1). Ecuador and Peru accounted for 13.6 and 13.3%, respectively, while 7.1% participants lived in Bolivia. Female participants were over-represented in the sample, comprising more than 60% of all respondents in all the surveyed countries. Participants from all the countries were mostly aged between 18 and 30. However, a significantly higher proportion of Bolivian consumers surveyed were in that age range. The age group 31 to 45 years old was mainly from Chile and Colombia, while participants aged more than 46 years old were mainly from Argentina. In each country, most participants were educated to undergraduate level or higher (range 72.9 to 87.9%) and lived in urban areas (range: 78.9 to 93.5%).

3.1. Characterization of consumer's attitudes towards FAW

South American consumers highly agreed with some ideas about the ideal characteristics of FAW and with measures to improve it. With median scores of 5.0 (Table 2), consumers thought that animal welfare should be taught in primary education, imported food should respect the same animal welfare conditions that are required in their country, welfare and protection of farm animals should be improved and new laws are required to improve FAW. Additionally, they highly agreed that farm animals feel pain and emotions, that they should be free from fear and distress, be well fed, well sheltered and be kept healthy, and should be able to express the natural behavior of their species. The statements related to the economic compensation of farmers and trust in retailers as sources of information also obtained median scores of 4.0, although with more variable responses. Consumers' ratings of their own level of knowledge of the FAW and improvements in farm animal husbandry were intermediate, although with wide variations. Finally, according to the median score (1.0), South American consumers did not believe that the current labels on products of animal origin allow the identification of farming methods and animal welfare conditions.

3.2. Consumer segmentation based on their attitudes towards FAW

The exploratory factor analysis grouped 12 variables associated with consumer perceptions into four factors. The final model explained 60.51% of the total variance (Table 3), with a high correlation among

Table 2

Overall median scores based on consumer responses ($n = 2852$) to questions on the online survey. The answers to these questions used a 5-point scale.

Online survey questions	Median (IQR)
Do you believe that farm animal welfare should be taught in primary education?	5.0 (0.0)
Do you believe that new laws are required to improve the FAW?	5.0 (0.0)
Do you believe that farm animals should be able to express the natural behavior of their species?	5.0 (0.0)
Do you believe that farm animals should be well fed, well sheltered and be kept healthy?	5.0 (0.0)
Do you believe that farm animals should be free from fear and distress?	5.0 (0.0)
Do you believe that farm animals feel pain?	5.0 (0.0)
Do you believe that farm animals feel positive or negative emotions?	5.0 (0.0)
Do you believe that the welfare and protection of farm animals in your country should be improved?	5.0 (0.0)
Do you believe that imported food should respect the same animal welfare conditions that are required in your country?	5.0 (0.0)
Do you believe that farmers should be financially compensated by the increased costs of improving animal welfare?	4.0 (1.0)
Do you believe that in stores and supermarkets, customers can easily find information about the feeding, welfare and farming conditions as well as the origin of the animals consumed?	4.0 (3.0)
Would you like to know on the label the price that the farmer receives for his/her products and the final sale price?	4.0 (2.0)
Do you believe, in general, that in the last 10 years the living conditions of farm animals have improved?	3.0 (2.0)
What is your level of knowledge about the living conditions of farm animals?	3.0 (2.0)
Do you believe that the current labels on products of animal origin allow for identification of farming and animal welfare conditions under which these were produced?	1.0 (1.0)

IQR: Interquartile range.

variables explained by the KMO value (0.622) and the Bartlett's test of sphericity ($P < 0.001$). The first factor identified was label as "ethical concerns about FAW", it was characterized by three of the 12 variables used (Table 2; farm animals should be able to express natural behavior of their species and be free from fear and distress, and the welfare and protection of farm animals should be improved), and it explained 20.6% of the total variance.

The second factor explained 15.1% of the total variance. It was characterized by two variables related to animal welfare information from retailers and labelling (customers can easily find information about

Table 1

Demographics of respondents to the animal welfare perceptions survey presented by country. Total $n = 2852$.

	Argentina ($n = 764$)	Chile ($n = 582$)	Colombia ($n = 538$)	Ecuador ($n = 389$)	Peru ($n = 378$)	Bolivia ($n = 201$)	<i>P</i>
Sex							
Female	81.0 (+)	77.8 (+)	67.7 (-)	66.1 (-)	65.9 (-)	77.6	***
Male	19.0 (-)	22.2 (-)	32.3 (+)	33.9 (+)	34.1 (+)	22.4	
Age							
18–30	41.6 (-)	39.9 (-)	46.3	51.2	49.2	74.1 (+)	***
31–45	25.0 (-)	37.8 (+)	33.8 (+)	32.1	28.8	17.9 (-)	
46–60	22.3 (+)	16.7	16.4	13.1 (-)	15.9	6.5	
>60	11.1 (+)	5.7	3.5 (-)	3.6 (-)	6.1	1.5 (-)	
Education level							
Primary/junior school	17.4 (+)	9.6	2.4 (-)	4.9 (-)	5.0 (-)	1.5 (-)	***
Secondary/high school	9.7	6.7 (-)	9.7	13.1 (+)	7.9	10.9	
Higher education	72.9 (-)	83.7	87.9 (+)	82.0	87.0 (+)	87.6 (+)	
Area of residence							
Urban	78.9 (-)	84.5	82.3	84.8	92.6 (+)	93.5 (+)	***
Rural	21.1	15.5	17.7	15.2	7.4 (-)	6.5 (-)	
Consumption of animal origin products							
Including meat	86.5 (-)	83.8 (-)	93.1 (+)	90.5	94.2 (+)	88.1	***
Only milk and eggs	13.5 (+)	16.2 (+)	6.9 (-)	9.5	5.8 (-)	11.9	

***Significance level established at $P < 0.001$ according to Chi-Square test. (+) Adjusted standardized residuals > 1.96 , indicating that the subcategory was observed more frequently than expected. (-) Adjusted standardized residuals < -1.96 , indicating that the subcategory was observed less frequently than expected.

Table 3
Factor analysis results for South America consumers related to attitudes towards animal welfare.

Online survey question	Ethical concerns about FAW	Confidence in retailer and skepticism towards food labeling	Optimism based on information	Concern and empathy towards farmers
Do you believe that farm animals should be able to express the natural behavior of their species?	0.782			
Do you believe that farm animals should be free from fear and distress?	0.781			
Do you believe that the welfare and protection of farm animals in your country should be improved?	0.719			
Do you believe that in stores and supermarkets, customers can easily find information about the feeding, welfare and farming conditions as well as the geographical origin of the animals consumed?		0.825		
Do you believe that the current labels on products of animal origin allow for identification of farming and animal welfare conditions under which these were produced?		-0.808		
What is your level of knowledge about the living conditions of farm animals?			0.764	
Do you believe, in general, that in the last 10 years the living conditions of farm animals have improved?			0.734	
Do you believe that farmers should be financially compensated by the increased costs of improving animal welfare?				0.702
Would you like to know on the label the price that the farmer receives for his/her				0.781

Table 3 (continued)

Online survey question	Ethical concerns about FAW	Confidence in retailer and skepticism towards food labeling	Optimism based on information	Concern and empathy towards farmers
products and the final sale price?				
Explained variance (%)	20.59	15.12	13.39	12.39

the feeding, welfare and farming conditions as well as the geographical origin of the animals consumed, and current labels on products of animal origin allow for identification of farming and animal welfare conditions under which these were produced). Therefore, this factor was labelled “confidence in retailer and skepticism toward food labelling”, as the variables showed an opposite direction in their factor loadings. That is, as consumers rely more on the retailer as a source of information about animal welfare conditions, they tend to do it less in labelling and vice-versa.

The third factor accounted for 13.4% of the total variance and was identified as “optimism based on information” and was characterized by two variables (perceptions on the consumers’ level of knowledge about the living conditions of farm animals and in the last ten years the living conditions of farm animals have improved). For those consumers that perceived to have a good understanding of animals living conditions, there has been an improvement of those conditions in the last ten years. The final factor was characterized for two variables (farmers should be compensated given the increased costs of improving animal welfare and whether the respondent would like to know on the label the price that the farmer receives for his/her products and the final sale price), was named “concern and empathy towards farmers”, and accounted for 12.4% of the total variance (Table 3).

3.3. Consumers segmentation

The hierarchical cluster analysis revealed four clusters or consumer profiles according to their perceptions towards AW (Table 4 and Table 5). Cluster 1, with most of the respondents (n = 1323, 46%), grouped consumers who were the most ethically concerned towards welfare conditions of farm animals, though they perceived themselves as the least informed and not very optimistic about the improvement of animal welfare in the last decade. This cluster was the least empathetic towards farmers, showing more confidence in the information provided by the retailers than by the food labels on FAW standards. Finally, consumers in this cluster highly agreed with all the proposed measures to improve FAW conditions. Most of the respondents were Argentina residents, followed by residents from Colombia and Chile in similar proportion, though their representation in this cluster was less relevant when compared to other clusters (Table 5). Women, urban residence, and age 46 to 60 years old were the demographic characteristics with the highest proportions in this cluster. In addition, 14% of people in this group did not eat meat, being the group with the highest concentration of consumers with this diet.

Consumers of cluster 2 were less ethically concerned towards FAW compared with clusters 1 and 3, and their optimism based on information was intermediate. However, they trusted the most in the food labelling as a source of FAW information compared to retailers, and their concern and empathy towards farmers were above the values for cluster 1 and 4. Consumers on this cluster highly agreed with all the proposed measures to improve FAW conditions, although compared to cluster 1, they tended to assign a lower score to the need for new laws to improve FAW. This cluster had a high proportion of respondents from Ecuador, Peru and Bolivia (57.5%), without higher education (27%), had one of the highest proportions of meat consumers (94%) and had a similar

Table 4

South American consumers segments according to their attitudes about farm animal welfare (FAW) and agreement with measures to improve AW conditions ($n = 2852$).

	Cluster 1 ($n = 1323$)	Cluster 2 ($n = 215$)	Cluster 3 ($n = 993$)	Cluster 4 ($n = 321$)	<i>P</i>
Attitudes towards FAW – factor scores - median (IQR)					
Ethical concern about FAW †	0.44 (0.36) ^a	0.24 (1.61) ^b	0.46 (0.41) ^c	-1.90 (1.30) ^d	***
Confidence in retailer and skepticism towards food labeling †	0.33 (1.48) ^a	-2.46 (0.83) ^b	0.51 (1.02) ^c	0.15 (1.02) ^d	***
Optimism based on information †	-0.58 (1.06) ^a	0.20 (1.47) ^b	0.89 (0.81) ^c	0.08 (1.34) ^d	***
Concern and empathy towards farmers †	0.01 (1.41) ^a	0.37 (1.46) ^b	0.49 (1.28) ^c	-2.20 (1.53) ^d	***
Agreement with measures to improve FAW conditions - median (IQR)					
Including AW in primary education teaching	5.0 (0.0) ^a	5.0 (0.0) ^a	5.0 (0.0) ^a	5.0 (1.0) ^b	***
New laws to improve FAW	5.0 (0.0) ^a	5.0 (0.0) ^b	5.0 (0.0) ^{ab}	4.0 (1.0) ^c	***
Imported food should respect the same conditions of AW than those in the consumer's country	5.0 (0.0) ^a	5.0 (0.0) ^a	5.0 (0.0) ^a	5.0 (1.0) ^b	***

† Factor scores of variables used to define clusters in the hierarchical cluster analysis. ***Significance level established at $P < 0.001$ according to Kruskal-Wallis test. Different letters (a, b, c) in the same row indicate significant differences ($P < 0.05$) between the profiles according to the Mann-Whitney *U* test.

proportion of men compared to clusters 3 and 4, but higher compared to cluster 1.

Consumers of cluster 3 ($n = 993$, 35%) were the most concerned and empathetic towards farmers, had the most positive perspective about the evolution of farm animal living conditions, and their perception on their own level of knowledge about farm animal living conditions was the highest of the four clusters. They were ethically concerned about FAW, highly agreed with all the proposed measures to improve FAW conditions and had the highest trust in retailers as sources of information about FAW conditions. Regarding socio-demographics, this cluster had the highest proportion of consumers with higher education, in the 31–45 age range (34.1%). Compared to cluster 1, it had a significantly higher proportion of men (Table 5) and half of its consumers lived in Argentina and Chile.

Consumers in cluster 4 were the least ethically concerned about FAW and the least empathetic towards farmers and tended to be neutral regarding their trust towards retailers and labels as a source of information about FAW conditions. Compared to clusters 2 and 3, consumers in cluster 4 perceived less advancement in FAW in recent years and felt less informed about the living conditions of farm animals. These consumers agreed the least with the measurements to improve FAW conditions at a societal level, although in all cases, the median score obtained was higher than 4.1. This cluster had one of the highest proportions of consumers with higher education but was not associated with a country of residence or an age range. Additionally, the cluster included a high proportion of men (43%) of respondents that included meat in their diet and that lived in rural areas.

4. Discussion

Our study provides new insights into the attitudes towards FAW of South American consumers of animal proteins, who have access to the internet and are mostly university educated. In general, consumers in our study expressed a high level of concern and interest in animal welfare issues and their relationship with agri-food products, following the

Table 5

Percentage of respondents according to sociodemographic characteristics of South American consumers segments according to their perceptions about FAW ($n = 2852$).

	Cluster 1 ($n = 1323$)	Cluster 2 ($n = 215$)	Cluster 3 ($n = 993$)	Cluster 4 ($n = 321$)	<i>P</i>
Country of residence					
Argentina	31.6 (+)	18.1 (-)	22.1 (+)	27.4	***
Chile	17.2 (-)	8.8 (-)	27.5 (+)	19.6	
Colombia	17.0 (-)	15.3	22.8	16.8	
Ecuador	13.2	19.5 (+)	13.3	12.5	
Peru	12.3	25.6 (+)	10.9 (-)	16.2	
Bolivia	8.7 (+)	12.6 (+)	3.5 (-)	7.5	
Sex					
Female	83.5 (+)	63.3 (-)	67.9 (-)	57.0 (-)	***
Male	16.5	36.7 (+)	32.1 (+)	43.0 (+)	
Age					
18–30	46.8	51.2	46.3	44.9	***
31–45	26.5 (-)	29.3	34.1 (+)	34.6	
46–60	20.1 (+)	12.1	14.7 (-)	12.8	
>60	6.7	7.4	4.8 (-)	7.8	
Education level					
Primary/ junior school	12.8 (+)	15.4 (+)	7.0 (-)	5.3 (-)	***
Secondary/ high school	9.9 (+)	11.6 (+)	4.1 (-)	7.8	
Higher education	77.3 (-)	73.0 (-)	88.8 (+)	86.9 (+)	
Area of residence					
Urban	87.6 (+)	81.9	82.2 (-)	79.4 (-)	***
Rural	12.4 (-)	18.1	17.8 (+)	20.6 (+)	
Consumption of animal products					
Including meat	86.0 (-)	94.9 (+)	88.4	98.1 (+)	***
Only eggs and milk	14.0 (+)	5.1 (-)	11.6	1.9 (-)	

*** Significance level established at $P < 0.001$ according to Chi-Square test. (+) Adjusted standardized residuals >1.96 , indicating that the subcategory was observed more frequently than expected. (-) Adjusted standardized residuals <-1.96 , indicating that the subcategory was observed less frequently than expected.

global trend. Although farming conditions may differ greatly between countries or regions, a general perception that these conditions were not good enough regarding animal welfare was found, coinciding with results from Mexico (Miranda-de la Lama et al., 2017), China (Carnovale et al., 2021) and Republic of Korea (J. M. Park, Koh, & Kim, 2022). At the same time, consumers in this study believed that FAW education, the development of new laws to improve FAW and the regulation of imports of animal products that incorporate animal welfare requirements were similarly important. A recent study by Pejman, Kallas, Dalmau, and Velarde (2019) carried out in the European Union showed regional differences in consumers' willingness to adopt more restrictive FAW regulations. The authors found that respondents from northern European countries (Poland and Sweden) were more likely to support more restrictive regulations compared to respondents from southern countries (Spain and Italy) (Pejman et al., 2019). Future efforts to improve FAW in South America should consider potential regional differences, which is of special importance when it comes to concluding treaties or reciprocal trade agreements between the countries in our study.

From the countries surveyed, only Chile, Argentina and Colombia have developed some minimum FAW standards (Bracke, Vermeer, & van Emous, 2019; Vargas-Bello-Pérez, Miguel-Pacheco, Figueroa, & Lensink, 2019; World Animal Protection, 2013). While Ecuador, Peru and Bolivia do not have regulations that provide clear guidance to producers other than minimum regulations about slaughter or transport (Molento, Souza, & Leite, 2015; World Animal Protection, 2013). In this diverse scenario, it is necessary to develop national standards appropriate to each country's agroecosystem and socioeconomic realities without

forgetting international FAW regulations as a reference. In parallel, some private certifications committed to local development could develop clear labelling that may improve consumer trust in producers and retailers, including those in the Latin-American region (Van Riemsdijk et al., 2017). Clear labelling that includes information on animal welfare care practices would reach consumers seeking to switch to such as products (Estévez-Moreno et al., 2021; Janssen, Roediger, & Hamm, 2016). However, the success of these labels will depend on how evident the benefits they guarantee in terms of FAW are in contrast to national or regional legislation. If differences are not large enough, these labels could lead to a weak demand for certified products as it was observed in the Sweden (Denver, Christensen, Nordström, Lund, & Sandøe, 2022), with a consequent impact on the industry.

Overall, our results showed a general level of consumer empathy towards farmers and a tendency to trust retailers as a source of FAW information. Despite a perceived lack of knowledge about farm animals living conditions, consumers tended to be critical of progress in FAW. The perceived lack of knowledge about farming may be the result of the growing gap between food consumption and production (Hepting, Jaffe, & Maciag, 2014). However, it may also be related to the lack of progress in labeling initiatives in South America. Miranda-de la Lama et al. (2017) found that Mexican consumers did not believe that the current animal product labels allowed identifying the farming and welfare conditions, similar to the present study. Product labels are a widely used mechanism to guarantee to “ethical consumers” that the food was produced in compliance with specific quality criteria associated with their social or environmental concerns. FAW labels have played a crucial role in providing information that helps consumers to better align their ethical values or FAW concerns with their purchasing intentions (Cornish et al., 2020). Knowing about the rearing conditions of farm animals is important for consumers, as this provides trust in the supply chain (Sullivan, Amos, & Van de Weerd, 2017), increasing their willingness to pay for animal-friendly welfare products (Miranda-de la Lama et al., 2019).

Finally, our sample showed that less than 5% of the consumers surveyed were vegans, coinciding with the data reported by The Nielsen Company (2016) for Latin American countries. This finding indicates that under the conditions of our survey, the consumption of animal products, especially meat, have a wide acceptance in the six countries sampled, while the preference for plant-based diets is becoming part of the food landscape in the region, sharing the trend of developed Western countries (Saari, Herstatt, Tiwari, Dedehayir, & Mäkinen, 2021). FAO estimates that the per capita consumption of protein in Latin America from a variety of sources will increase over the next decade (OECD/FAO, 2021). However, a deeper understanding of the motivations and concerns behind the preference for plant-based diets may provide a more rounded understanding about FAW perceptions of citizens in this region.

4.1. Emerging attitudes regarding FAW

Factor analysis identified four sets of attitudes regarding FAW. The factor “ethically concerned about FAW” grouped consumers’ concerns about two of the “five freedoms” that refer to both the physical fitness and mental suffering of farm animals (to express their natural behavior, and to be free from fear and distress) (Webster, 2001). It further included the growing general perception that FAW should be protected and enhanced (Alonso, González-Montaña, & Lomillos, 2020). The concerns grouped in this factor about the ideal characteristics of livestock farming are associated in some contexts with the choice of meat or plant-based diets (Alonso et al., 2020). However, as all participants in this study consumed animal products, variations in this factor may reveal subtle differences in consumers’ views of FAW, for example the selective consumption of animals based on individual ethical standards (Rothgerber, 2015).

The factor “trust towards the retailer and skepticism toward food labeling” showed that consumers value the reliability of these sources of

information in opposite directions within their purchase decision process for animal products, which means that those who trusted labels tended to distrust other types of information provided by retailers, and vice versa. This finding reinforces the idea that in South America, greater efforts should still be made to include information on animal welfare in product labelling (Miranda-de la Lama et al., 2019). Additionally, it demonstrates that the strategies used by retailers to transmit to their clients the information they consider relevant regarding FAW go beyond product labels, as happens in general with other sustainability-related information (Vadakkepatt et al., 2021). This finding is interesting as retailers play a fundamental role in the purchasing behavior of their customers (Miranda-de la Lama, Sepúlveda, Villarroel, & Maria Levino, 2013). When choosing retailers that incorporate products with ethical attributes, consumers consider the quality of the store, price, and beliefs about corporate social responsibility (Hwang & Chung, 2019). In the South American context, where food distribution via small retailers is still in place (D’andrea, Lopez-Aleman, Stengel, & Argentina, 2006), it has been shown that aspects such as a more direct relationship with the staff, the possibility of choosing and the perceived freshness of the products are associated with greater trust towards certain beef retailers (Colella & Ortega, 2017). It is even possible, as suggested by the results of Ortega and Wolf (2018) that the demand for animal welfare attributes may vary according to the retail channel. Considering the diversity of distribution channels of animal products in our study countries, the role of retailers in the consumption of animal welfare-friendly products has yet to be studied further. Moreover, regardless of the way in which information on the level of FAW is conveyed to consumers, South American countries should still make greater efforts in this regard.

The third factor, called “optimism based on information”, may derive from the contemporary phenomenon of the access that citizens and potential consumers have to diverse sources of information, especially those coming from the Internet. This growing access to information makes it possible to learn about the problems associated with FAW, and about the efforts made to improve the conditions in which animals are kept. This finding aligns with what has been happening with intensive farming around the world, as an increase in FAW concern has made various international companies to make commitments to change their supply chain policies and requirements (Sullivan et al., 2017). Thus, FAW can be a critical issue for many companies; problems of animal welfare can quickly become a global corporate crisis once they become viral in social media. For farmers, it is an added risk because they may see their contracts cancelled under pressure from consumers (Fernández-Mateo & Franco-Barrera, 2020).

The factor “Concern and empathy towards farmers” reflected the existence of different views on the role and responsibility of stakeholders linked to the production and consumption of animal products. One view was that FAW should be an exclusive obligation of farmers, while the other was that it should be a shared responsibility of the society. In the middle of these views, several conflicts between farmers and consumers emerge, partially linked to the different ways how stakeholders conceptualize FAW which lead to the scrutiny of farmers by the consumers (Buddle, Bray, & Ankeny, 2021). As a shared responsibility, consumers recognize the cost implications of altering production practices in response to their demands (Ortega & Wolf, 2018), linked in this case to improving FAW conditions. Such concern is also in line with another related with the farmers’ welfare and the possible asymmetries in the distribution of benefits among the stakeholders involved in the production of animal-origin foods, which are also part of the ethical consumers’ concerns (Starr, 2009; Toti, Diallo, & Huaman-Ramirez, 2021). The view that all the stakeholders (farmers, society, food businesses, etc.) involved in the animal production chain are similarly responsible for FAW has been previously observed in other regions (European Commission, 2016).

In the context of global North/South trade relations, these issues have motivated the rise of Fair Trade agri-food markets (Doherty, Smith, & Parker, 2015). These have seen a notable development in agricultural

commodities such as coffee and cocoa in Latin America (Raynolds, and America, N. W. S. E.-F. Certification in L, 2018) but appear less developed in farm animal products. In Mexico, the factor “commerce” was identified among consumers who also agreed that farmers should receive compensation for their work towards better animal welfare (Miranda-de la Lama et al., 2017). South American consumers may perceive that farmers’ livelihood depends heavily on the income from their produce as in Mexico, as farm production in this region relies mostly on small to medium farming enterprises with few integrators working at national level and limited or non-existent government subsidies (Williams & Anderson, 2020).

4.2. Consumers’ profiles

This study is the first in the South American region to segment consumers based on their attitudes towards FAW. Beyond the generalized concern and interest in AW, the cluster analysis revealed different types or segments of South American consumers according to their perceptions and attitudes on this issue. Although some of the socio-demographic aspects studied were associated with these profiles, the motivations or factors behind such perceptions have yet to be analyzed, as well as the possible links between these, consumers’ willingness to pay for animal welfare, and their purchasing behavior. The demographic characteristics of the respondents are a reflection of current regional demographics (United Nations Statistics Division, 2021). However, it needs to be considered that demographics such as age or education may have been influenced by access to the internet and online presence (Eysenbach, 2005). Distribution by sex may have been influenced by the over participation of women in surveys, either paper-based or online (Smith, 2008).

Cluster 1 combined some sociodemographic characteristics that have been associated with a great concern or sensitivity towards FAW. In several studies, women have shown higher pro-animal welfare attitudes compared to men (Albert, Kota, Boatey, & Minegishi, 2020; Clark et al., 2016; Estévez-Moreno et al., 2021), very likely due to a social effect on women beliefs towards social dominance, human supremacy, and speciesism (Graça, Calheiros, Oliveira, & Milfont, 2018). Being from an urban setting has also previously been linked to higher FAW concerns in Mexico and Spain (Estévez-Moreno et al., 2021; Miranda-de la Lama et al., 2017). Urban consumers are not as directly dependent on animals for food and livelihood as rural people, and pet ownership has replaced the more utilitarian relationship with livestock (Kendall, Lobao, & Sharp, 2006). Additionally, their opinions and concerns about farm animals tend to be influenced by information and experiences far removed from direct exposure to farmed animals and primary production processes (Kendall et al., 2006; Taylor & Signal, 2009). As urban consumers disconnect from the social reality of farmers (Parker et al., 2018; Schröder & McEachern, 2004), this could explain the reduced empathy towards farmers seen in this cluster. The relationship between a high FAW consciousness and being critical towards farmers has also been observed in “production-interested” meat consumers (Grunert, Sonntag, Glanz-Chanos, & Forum, 2018).

In the case of cluster 2, consumers’ perceptions of FAW conditions may be explained partially by its demographics. This cluster grouped a high proportion of men, respondents without higher education and meat-eaters. In previous studies of FAW perceptions and meat consumption, men showed lower levels of empathy towards animals (Graça et al., 2018), had lower awareness of animal welfare responsibility and were inclined to consume more “ethically incorrect” animal products (e. g. foie grass) than women (Blanc, Massaglia, Borra, Mosso, & Merlino, 2020). Similarly, consumers with lower education level have lower positive attitudes towards FAW (Clark et al., 2016; Estévez-Moreno et al., 2021; Miranda-de la Lama et al., 2017, 2019). Having little interest in animals and their welfare has been associated with a type of consumer who does not align with any animal-ethics intuitions and who consumes animal products without ethical restraints (Hölker, Von

Meyer-Höfer, & Spiller, 2019). Interestingly, a high proportion of consumers in cluster 2 lived in countries (Ecuador, Peru and Bolivia) with a rich agricultural history that started before the region was known to Europeans (Morris, 1999). These countries have seen, and continue to see, an increase in rural-to-urban migration (Carrillo-Larco et al., 2017; Rodríguez-Vignoli & Rowe, 2018); therefore, consumers may be more aware of farmers reality showing greater concern and empathy towards them. Our findings about the opinion towards retailers and labels were in line with those of Castillo and Carpio (2019) in Ecuador, where most of the consumers agreed that a FAW certification would stimulate producers and wholesalers to improve the quality of beef. They also tended to trust international private organizations that provide this kind of certifications, whose standards are conveyed by labels (Castillo & Carpio, 2019). To improve communication strategies along the production value chain, further research is required to identify and understand the factors that influence the trust of these consumers towards labeling as a source of information and assurance of FAW conditions.

Consumers in cluster 3 were close to cluster 1 in their high ethical concern about FAW but differed in the other attitudes analyzed. Their greater empathy towards farmers and trust towards the retail channel showed that they recognized the multiple actors involved in the production processes (a “farm to table” perspective), and the social awareness that accompanies their concerns towards animal welfare. This finding reinforces the observations of Ariztía et al. (2014) on the existence of ethical consumers in South American countries, which contrasts with the idea that ethical consumption is associated with middle-class people in income-rich countries. Our finding suggests the existence of a segment of ethical consumers whose concerns include the common consideration of the well-being and welfare of humans and animals approaching a “One Welfare” perspective (Pinillos, 2018). Living in rural areas may influence their empathy towards farmers and their belief in being informed about animal welfare conditions (Schröder & McEachern, 2004). The interest of cluster 3 consumers regarding FAW coincided with findings from Mexico and Spain, where consumers with higher education level and age range between 31 and 45 are highly concerned about FAW (Estévez-Moreno et al., 2021; Miranda-de la Lama et al., 2019). Higher education has also been linked to a high sensibility towards FAW in Chile and Colombia (Ariztía et al., 2014; Rucínque et al., 2017).

The cluster 4 grouped consumers who, according to their ethical concerns about FAW and their level of agreement with the measures proposed to improve FAW conditions, seemed to be the least interested and concerned about FAW. In this sense, this cluster was similar to the “skeptical consumer” cluster identified by Miranda-de la Lama et al. (2019) among Mexican consumers. Some sociodemographic aspects already mentioned, which have been related to less empathetic attitudes towards animal welfare, could help to explain this result. For example, the proportions of consumers in this group who were men, consumed meat, and had rural origins, was significantly higher compared to cluster 1. However, the educational level of these consumers tended to be higher than those in cluster 3, which is highly ethical concerned with FAW conditions, and the proportion of the rural population was similar to cluster 2, but their empathy towards the farmer was opposite. Interestingly, cluster 4 was not associated with any country of origin, which showed its widespread existence around South America. In any case, the characteristics of this cluster make visible the possible existence of another segment of ethical consumers for whom the welfare of producers can be a strong incentive to buy animal welfare-friendly products.

Overall, our results showed that consumer attitudes towards FAW are not unidimensional but go beyond the existence of a lower or higher level of concern about the issue. Several studies have shown that FAW concern is one of the main motivations behind the consumption of plant-based diets or diets with low levels of animal products (De Backer & Hudders, 2015; Janssen, Busch, et al., 2016; North, Klas, Ling, & Kothe, 2021; Verain, Dagevos, & Jaspers, 2022). However, our findings showed

that South American consumers of animal products had contrasting opinions about farmers and the way responsibilities and costs are distributed among stakeholders involved in the value chain, some considered that the latter should be based on farmers' efforts in favor of FAW. Consumers also differed in their level of trust in different sources of information to which they have access and how they relate the information they have with their perceptions regarding the functioning of the agri-food chain.

Differences in consumer attitudes and motivations should be considered in the design of integrated strategies to improve the transmission of FAW information along the value chain. This consideration is essential since the relevance of FAW is increasing among meat consumers in the region (i.e. Colombia; Ramírez et al., 2021), and FAW information represents an extrinsic attribute of food quality, influencing hedonic and emotional responses towards animal products (Jiang et al., 2021). Other strategy to improve transmission of FAW information could be aimed to link animal welfare and social justice standards, this is of relevance for the countries studied. Intensive production coexists alongside small and medium-scale production in South America, supporting the livelihoods of thousands of rural families, still relevant in terms of their contribution to the provision of food for domestic consumption in this region (Salcedo & Guzmán, 2014). The four consumer profiles identified across countries imply that the strategies designed by the industry and/or the local governments must be targeted to the observed diversity of consumers.

The main limitation of our study was that it was applied as a self-administered questionnaire run on volunteers, so only people motivated by an interest in the topic may have taken part in the survey (cf. self-selection of the sample) (Hassen, El Bilali, Allahyari, Berjan, & Fotina, 2021). Limitations shared with other online based survey studies were that these tend to exclude consumers or volunteers without internet access, those who are not prone to use social networks, and elder people, while attracting a higher proportion of women, who are more likely to respond to surveys (Espinoza-Ortega et al., 2021; Hessel et al., 2019). These limitations raise the need for further efforts to study, possibly using data collection methods other than the online survey, the FAW attitudes of South American consumers who meet these characteristics, targeting, for example, low-income urban consumers, or rural communities. Our results confirmed some trends regarding the relationship of consumers' attitudes and socio-demographic variables and showed some associations between consumer profiles and countries of origin, but did not address the comparison of countries, which could have provided valuable insights.

5. Conclusions

This is the first study that contributes to our understanding of this region's consumer attitudes towards FAW and could support the development of government and stakeholder animal welfare policies and influence how the production and supply chain operates to fulfil consumer requirements. Although FAW is a relatively new commercial phenomenon in South America, our results showed that concern for animals may be a universal human value, which can overcome traditional dichotomies between rich-poor or developed-undeveloped countries. However, consumers' view of FAW is not unidimensional, as it is affected by different underlying attitudes that cut across the countries studied. These attitudes include ethical concerns about FAW, trust in retailers and labels as sources of information, information-based optimism, and empathy towards farmers. Two of the four consumer segments that emerged from these attitudes are ethically concerned about FAW and tend to trust retailers. However, while some feel informed, optimistic and empathetic towards farmers, others are highly critical of current conditions and farmer responsibility. On the other side are the less concerned, less optimistic and informed and less empathetic consumers. Finally, a fourth consumer segment was identified with an intermediate concern about FAW, but who tends to trust labels much more

than retailers as a source of information. The groups identified are important for policy makers and all those involved in the supply chain, as there remains a need to connect consumer concerns with the agri-food supply chain. In this regard, our findings evidence the gap in the transmission of information to consumers by some retailers, and especially the weaknesses in labeling regarding farming conditions. They also reveal that empathy for the farmer is an ethical concern that complements concern towards FAW in several South American consumer segments. To promote animal welfare at the regulatory and market level in South America, decision-makers must recognize the consumers concerns. Findings of this study represent an opportunity to combine both concerns in marketing strategies and to improve the wellbeing of farmers while improving FAW.

Authorship statement

All persons who meet authorship criteria are listed as authors, and all authors certify that they have participated sufficiently in the work to take public responsibility for the content, including participation in the concept, design, analysis, writing, or revision of the manuscript.

CRedit authorship contribution statement

Laura X. Estévez-Moreno: Data curation, Formal analysis, Writing – original draft, Writing – review & editing. **Genaro C. Miranda-de la Lama:** Conceptualization, Methodology, Resources, Writing – review & editing. **Giuliana G. Miguel-Pacheco:** Conceptualization, Methodology, Investigation, Data curation, Writing – original draft, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the study reported in this paper.

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