

**Farm animal welfare influences on markets and consumer attitudes in Latin America: The cases of Mexico, Chile and Brazil**

*Running title: Consumer attitudes and perceptions towards farm animal welfare in Latin America*

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1 **Farm animal welfare influences on markets and consumer attitudes in Latin America: The cases of**  
2 **Mexico, Chile and Brazil**

3  
4 **Abstract**

5 In recent years, animal welfare has become an important element of sustainable production that has evolved  
6 along with the transformation of animal production systems. **Consumer attitudes towards farm animal welfare**  
7 **are changing around the world, especially at emerging markets of Asia, Africa and Latin America.** Survey-  
8 based research on consumer attitudes towards farm animal welfare has increased. However, the geographical  
9 coverage of studies on consumer attitudes and perceptions about farm animal welfare has mostly been limited  
10 to Europe, and North America. Until now, Latin American consumers' attitudes towards animal welfare have  
11 not been well studied. Despite the fact that Mexico, Chile and Brazil belong to the same region (according to  
12 international organizations), there are marked differences between these countries in terms of their  
13 economical and geographical characteristics among other factors. Those differences potentially have an  
14 impact on consumer attitudes towards animal welfare and livestock production systems in general. **Given the**  
15 **evidence from the literature review, it seems advisable that Latin American producers and food industry who**  
16 **engage in animal welfare-enhancing practices should clearly label their products with information on the type**  
17 **of husbandry system to reach those consumers who want to make an informed choice.** Therefore, there are  
18 some aspects that need to be studied and cannot be worked separately in order to promote and understand  
19 consumer attitudes towards dairy and beef systems, such as geography, economic development, and politics.

20  
21 **Key words:** Farm animal welfare; Livestock production; Consumer attitudes; Latin America.

## 30 **Introduction**

31 Sustainability of food production systems and consumption, as well as the role of ethical labels, such as  
32 organic, fair trade and animal welfare, have received a lot of attention in both the public domain and in  
33 research (de Jonge et al. 2015; von Keyserlingk and Hötzel 2015). Actually, animal welfare has become an  
34 important item of sustainable production that has evolved along with the transformation of animal production  
35 systems (Miranda de la Lama et al., 2013). **Animal welfare can be defined as ‘the state of the individual as  
36 regards its attempts to cope with its environment’ (Broom, 1991), this definition lies at the heart of debates on  
37 how animals should be bred, kept, used, transported and slaughtered (Woods, 2012). Historically, increased  
38 awareness of livestock production systems has been associated with society becoming more involved in  
39 demanding and promoting changes in livestock production systems (Yunes et al., 2017). Consequently animal  
40 welfare requires a multidisciplinary approach and a balance of science with philosophical components. In that  
41 sense, animal welfare is a mixture of science and values (Marie, 2006).**

42

43 A diverse group of stakeholders, including citizens, farmers, public authorities, and the food industry, are  
44 increasingly confronted, interested, or concerned with the welfare of farm animals (Verbeke 2009). Many  
45 studies related to this topic have focused on the end user of the chain, both in their role as citizens and  
46 consumers. The public can influence the marketing and sale of premium welfare products by acting as citizens  
47 and as consumers (de Graaf et al. 2016). Recently, survey-based research in consumer attitudes towards farm  
48 animal welfare has increased. However, the geographical coverage of studies on consumer attitudes and  
49 perceptions about farm animal welfare has mostly been limited to Europe [e.g. María (2006); Vanhonacker et  
50 al. (2008); Vanhonacker et al. (2009); Vanhonacker et al. (2011); Vecchio and Annunziata (2012)] and North  
51 America [e.g. Kendall et al. (2006); Tonsor et al. (2009); McKendree et al. (2014)]. Few studies have been  
52 done in Latin America, and it is an emerging topic especially in those countries that trade with Europe or the  
53 United States of America. Livestock producers as well as veterinary services related to ministries of  
54 agriculture are aware that international commercial agreements apply them to meet animal health regulations,  
55 but also other requirements of traders and consumers (Gallo 2008).

56

57 Recent scientific evidence in the region indicates that Latin American consumers are becoming more  
58 concerned about animal welfare and husbandry systems, and in many cases, animal welfare is considered as a  
59 quality assurance of food of animal origin (Webster 2001; Queiroz et al. 2014; Vargas-Bello-Pérez et al.  
60 2017; Miranda-de la Lama et al. 2017). *Urbanization and media, influences of civil society organizations and  
61 increase in society's education and economic level are the reasons for an increased interest in animal welfare  
62 (Koknaroglu and Akunal, 2013).* Furthermore, as the average income and overall wealth is generally  
63 associated to increased expectations regarding livestock husbandry conditions and animal welfare (Verbeke  
64 2009), it can be expected that social demand regarding animal welfare and the associated products will  
65 increase in Latin American countries. On the other hand, there are many differences (i.e., geography, socio-  
66 demographics, politics, and economic situation) among Latin American countries, which have a great  
67 potential to interfere on the opinion of consumers and their attitudes towards animal production systems.  
68 *Mexico, Chile and Brazil are all member countries of the World Organisation for Animal Health (OIE) and  
69 adhered to the animal welfare definition provided in the Terrestrial Animal Health Code: “Animal welfare  
70 means how an animal is coping with the conditions in which it lives. An animal is in a good state of welfare if  
71 it is healthy, comfortable, well nourished, safe, able to express innate behaviour, and if it is not suffering from  
72 unpleasant states such as pain, fear and distress” (OIE 2016).* Similarly they have become referents in the  
73 *Latin American region in terms of productivity of scientific publications, being the three in the top five for the  
74 region and Brazil in the 6<sup>th</sup> place worldwide. Despite the high scientific productivity in the animal welfare  
75 topic, only few studies have included consumers’ attitudes and perceptions.* In this context, we described  
76 some production aspects related to livestock production, consumer preference, and some political aspects of  
77 Mexico, Chile and Brazil (the most stable countries in terms of livestock industry). This perspective paper  
78 aims to discuss these aspects and associate them with the results of published studies on consumer attitudes  
79 towards livestock production and welfare. The conclusions should allow policy makers and different  
80 stakeholders of the animal production chains to adapt their animal welfare strategy to the situation  
81 encountered in the different countries.

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84

85 *Livestock production and consume*

86 Latin America is an important region for livestock production and global trade of animal products. According  
87 to FAO (2014), Brazil and Mexico have the greatest numbers of livestock among Latin American countries.  
88 Brazil has around 213 million, while Mexico reported 39 million heads of cattle and Chile has over 3.7  
89 million heads of cattle (ODEPA 2015). In addition, Brazil is the top meat producer in Latin America and  
90 shares with Mexico the first positions in milk production (United Nations, 2015). In a recent publication, beef  
91 and veal consumption in Brazil is reported as 24.2 kg/capita, while it is 15.0 kg/capita in Chile and 8.8  
92 kg/capita in Mexico (OECD 2017). Between these three countries, Brazil is also the highest milk consumer  
93 (124.6 kg/capita), followed by Mexico (115.2 kg/capita) and Chile (93.0 kg/capita) (FAO 2011). These  
94 consumptions might be related to living standards, diet, livestock production and consumer prices (OECD  
95 2017). Land and agricultural areas (Table 1) are important factors needed to be considered for consumer  
96 perception studies since they have a deep impact on animal production systems, especially because these  
97 conditions may influence the type of production (i.e., grazing vs. confinement), which will be preponderant in  
98 each country according to their geography and land distribution. Millman (2009) suggested that attitudes  
99 towards farm animals from people living in urban areas could be different since they have less direct  
100 experience with agriculture. Another important aspect in Latin America and the Caribbean region is that the  
101 *per capita* gross annual income (GNI) was doubled between 2000 and 2012 (United Nations 2015; FAO  
102 2014). An interesting point that deserves some attention is the external funding that Latin American countries  
103 received. The percentage of Official Development Assistance (ODA) to agriculture, forestry and fisheries to  
104 the entire region is about 8.5% according to FAO (2014). For example in Brazil, more than 1.9% of ODA  
105 went to agriculture whereas Chile and Mexico received 1 and 0.2% respectively. As the general global trend,  
106 Latin America is becoming more urban. According to FAO (2014), over the past 50 years, the rural  
107 population in this region has gradually declined mainly due to the persistent economic inequality between  
108 urban and rural areas.

109

110 With a population of approximately 112 million, Mexico per capita annual consumption of cattle products  
111 consists of 17 kg of beef and 97 kg of milk (42% fluid milk and 58% milk products). Large scale production  
112 in Mexico has increased the availability of affordable dairy and meat products, such “benefit” has contributed

113 to rising rates of obesity and diseases related to obesity. As a result, a growing number of Mexican consumers  
114 are pursuing lifestyles that include and buying more “natural” and healthier food (Salcido, 2011). Mexican  
115 consumers, particularly from the middle, upper-middle and higher-income strata’s (23, 16, and 6.7 million of  
116 people, respectively) purchase high quality milk (Nahed-Toral et al., 2013) and meat (Huerta-Leidenz et al.,  
117 2014) to satisfy their preference. On the other hand, rapid changes in domestic consumer preferences and  
118 increases in population have led to dynamic changes in its meat industry. The population and the general  
119 economic growth in this country have hastened changes in the quantity and quality of meat demanded. In the  
120 past decade, significant numbers of cattle have been exported from Mexico to the United States (their  
121 consumer prefer fat deposition), and this has led to a shift from grass-fed beef to grain-feed beef. The  
122 implications of increased production intensity reach far beyond the characteristics of the beef (Mexican  
123 consumers prefer lean meat with minimal fat) (Méndez et al., 2009). Probably in a short- to mid-term,  
124 Mexican consumers will be aware that the beef production systems are in confinement and not in grazing  
125 systems as it used to be. These changes in beef production systems are most likely to affect beef consumers  
126 perception.

127

128 The geographic complexity of Chile makes it a country with important demographic differences among  
129 regions, which can define habits and changes in meat consumption. Most beef and milk production is  
130 concentrated in the southern regions of Chile (ODEPA 2015). Beef production is concentrated in the southern  
131 regions of the country, mainly in outdoor extensive systems, so although the production system might be  
132 animal welfare friendly, in many situations cattle needs to be transported for long distances before arriving to  
133 the slaughter houses (Gallo and Tadich 2008). Chilean consumers have a positive perception of the cattle  
134 production related to the fact that the meat that they consume comes from pasture-fed animals (Schnettler et  
135 al. 2008) and they have increased acceptability ratings for beef with low marbling levels and beef from  
136 grazing animals (Morales et al. 2013). With regard to milk, the main aspects considered by Chilean  
137 consumers before purchasing dairy products are fat content and price. Also they associate animal welfare  
138 mainly to responsible pet ownership followed by farm animal care (Vargas-Bello-Pérez et al. 2017).

139 Brazil is one of the largest producers and exporters of animal origin products in the world (FAO 2014), which  
140 involves the country to adapt some quality standards required by internal and external consumers and clients

141 to stay competitive at world level. The importance of animal production on the economic performance and  
142 towards generating jobs is irrefutable. Brazilian beef production in 2023 is estimated in 10,935 million tons of  
143 meat, representing an increase of almost 29% relative to 2013, and 20% of the global market share (Lobato et  
144 al. 2014). Brazilian beef cattle production can be considered as “grass-based systems”, since all breeding and  
145 rearing are made on pastures, and only 7.5%, or even less, of the slaughtered cattle are finished on feedlots,  
146 and for a short period of time (Lobato et al. 2014). Brazilian consumers prefer products with a label that  
147 ensure tenderness of the meat (Saab 1999) and are willing to pay more to buy those products (Velho et al.  
148 2009). Brazil is the fourth largest milk-producing country in the world (FAO 2013). In the south of the  
149 country, milk is mainly produced in small holding farms (IBGE 2009), where milk production may be  
150 essential for the maintenance of family farming in the region (Balcão et al. 2016). Interestingly, in recent  
151 years there has been an increase in the number of large-scale dairy farms which are characterized by a large  
152 number of animals in milk production (IBGE 2009).

153

#### 154 *Farm animal welfare in all three countries*

155 All three countries have undertaken scientific research in order to support local policy, which is aligned with  
156 OIE farm animal welfare standards for local animal welfare laws and regulations (Table 2). Mexico has the  
157 second largest economy in Latin America, behind Brazil. Mexico has significant beef production and is one of  
158 the highest eleven beef exporters in the world (USDA, 2016). The implementation of The North American  
159 Free Trade Agreement (NAFTA), along with a series of open macroeconomic policies during the late 90’s  
160 and 2000’s, led Mexico’s economy into steady growth. However, the dependence of Mexico on trade with the  
161 United States of America has a large impact in the animal production sector, reflecting in an intensification of  
162 animal production systems. Since the late 1990s, Mexico has developed a series of comprehensive laws,  
163 regulations, and standards and signed many international agreements concerning animal welfare issues. Yet  
164 for all their existence and despite government efforts, the regulations continue to lack effective enforcement  
165 and surpassed by the productive reality (Norman and Hernández, 2005). Mexico has been slow to update its  
166 legal regulations on farm animal welfare, which includes some guidelines on animal transport, stunning and  
167 slaughter throughout the pre-slaughter supply chain (Miranda-de la Lama et al., 2012). Nevertheless, Mexican  
168 citizens are currently developing a sense of growing concern about the protection and welfare of animals

169 (Aguirre and Orihuela 2010). Additionally, Mexican empathy towards animal welfare could be a strategy for  
170 re-directing the frustration for solving issues of inequity justice and social exclusion (see Sandoval-Cervantes,  
171 2016). The latter could be related to security issues; since Mexico is facing one of the worst security crisis,  
172 institutional credibility and impunity of the contemporary history, in which corruption and the apparent  
173 governmental indolence have deteriorated the social confidence towards Mexican government (Bailey 2006).  
174 In the face of a possible increasing demand in Mexico for products that take into account animal welfare and  
175 higher quality products, the supply chain (i. e., farmers, abattoirs, dairy and meat industries, retailers) should  
176 guarantee the origin of the products by certification. However, debeaking, detoeing, tail-docking, tooth  
177 pulling, castration, and dehorning of livestock without anaesthetic are legal in Mexico, as is confinement in  
178 gestation crates and battery cages (WAP, 2014). Therefore, it is essential to develop own methods based in  
179 Mexican reality for assessing farming systems and certifying organizations that guarantee the authenticity of  
180 animal welfare friendly products. At the same time, it will be necessary to inform consumers and convince the  
181 meat and dairy industry that the ethical value of a product is an element of growing economic importance and  
182 a business opportunity (Miranda-de la Lama et al. 2014).

183

184 Chile was the first neoliberal policy experiment in Latin America, with privatization, deregulation and export-  
185 orientation (Harvey 2007). With only a small domestic market, often cited as one of the most open and free  
186 market economies in the world, it has been argued that market actors have been central in the recent raise of  
187 ethical consumption (Kane et al. 2007). Previous publications stated that, during the military coup in 1973,  
188 the regime de-regulated the national economy and sought to integrate Chile into global trade (Cademartori  
189 1998) as well as banned unions, discouraged co-operatives and policed civic political expression. This context  
190 has led to a limited extend of civil society activity in Chile even today, which can explain why Chilean  
191 consumers are recently demanding for changes not only in their politics but also in their productive sectors  
192 such as livestock production (Ariztía et al. 2014). Since 2009, Chile has an Animal Protection Law  
193 (Ministerio de Salud 2009), which provides a frame work for the welfare of various species involved in  
194 different activities (i.e., education, research, entertainment and animal production systems). Later on in 2013,  
195 three complementary regulations for animal production systems arose from this law: 1) the protection of farm  
196 animals within an industrial system; 2) the protection of animals destined for human consumption during



197 slaughter; and 3) the protection of farm animals during transport (Law 20.380; decree laws 28, 29 and 30)  
198 (Ministerio de Salud 2009). In general, these regulations are in accordance with the animal welfare strategies  
199 of the World Organization for Animal Health (OIE) and have facilitated compliance with international  
200 markets requirements, considering that the country exports beef to the European Union. On the other hand,  
201 they respond to an increasing demand from consumers for accessing products of animal origin with “animal  
202 welfare standards”, or produced under “ethical management” (Schnettler et al. 2008).

203

204 Compared to Chile, Brazil, with its large domestic market, active civil society and successive centre-left  
205 governments, has been carving out a different set of institutional contexts that favored the development of  
206 ethical consumption (Ariztía et al. 2014). These regulations were implemented by the Ministry of Agriculture,  
207 Livestock and Food Supply in 2008, and complemented in 2011 by the establishment of the “Permanent  
208 technical committee in animal welfare”. However, as recently mentioned in the von Keyserlingk and Hötzel  
209 (2015) review, the Brazilian government effort to implement such regulations has been limited and has also  
210 failed to consider societal attitudes towards animals. The relatively little information and poor understanding  
211 of consumers attitudes regarding animal welfare in production systems in developing countries may be related  
212 to the aforementioned failure of adoption of regulations. Effectively, von Keyserlingk and Hötzel (2015)  
213 emphasised the importance of public concerns consultations as a key practice prior to the industrial or  
214 governmental development of farm animal welfare related solutions and posterior success in their adoption.  
215 Furthermore, the engagement of the different sector stakeholders such as farmers, consumers, agricultural  
216 technicians, government and industry personal are crucial to attain a consensus in animal welfare related  
217 issues (Poletto and Hötzel 2012).

218

### 219 *Consumer’s attitudes towards farm animal welfare*

220 Individuals may have different attitudes depending on whether they are acting in their role as a citizen or a  
221 consumer. As citizens, they report a high level of concern about modern production systems, and having  
222 welfare friendly production systems, as important. However, as consumers they have other priorities when it  
223 comes to purchasing products (Clark et al., 2016). Over the past years, various accounts of ethical  
224 consumption have been the central to mediating the ethical relationship between the consumer and the

225 consumed (Manyukhina, 2017). Many studies especially from Europe have demonstrated a strong consumer  
226 interest in farm animal welfare. This interest has influenced consumer attitudes, especially in terms of their  
227 willingness to pay and purchase behaviour. For example, in the Netherlands the differentiation in terms of  
228 animal welfare standards and price in the meat sector play an important role in satisfying consumer  
229 expectations (de Jonge et al. 2015). It has been shown that European consumers are willing to pay more for  
230 food produced under animal welfare standards (Zander and Hamm 2010). However, differences are also  
231 found between consumers from different countries, indicating that consumer behaviour regarding animal-  
232 friendly products is affected by cultural differences and consumers' trust in farmers, which can show, for  
233 example, differences between northern European and southern European countries (Nocella et al. 2010).  
234 Therefore, consumer attitudes towards welfare-friendly products are changing around the world, especially at  
235 emerging markets of Asia, Africa and Latin America. Furthermore, there are currently no national specific  
236 regulations governing the essential requirements for certification of welfare friendly products that could meet  
237 the higher expectations of Latin American consumers (Table 3). Although some food industries and  
238 supermarket chains have developed voluntary codes of practice and animal welfare standards, our revision  
239 suggests that consumer demand for these products is not always being satisfied.

240

241 In Mexico, there are some recent publications reporting consumer opinions and attitudes towards animal  
242 welfare. Healthy food and environmental protection are attributes more valued than animal welfare (Santurtún  
243 Oliveros et al., 2012) probably due to the change of Mexican consumer lifestyle, which includes healthier  
244 eating and interest for “natural” products (Salcido, 2011). However, it is expected that Mexican consumers  
245 concerns toward animal welfare will increase with the knowledge about the intensification of the food  
246 production systems, as previous mentioned. For example, a recent study of Miranda de la Lama et al. (2017),  
247 Mexican consumers appear to be interested in farm animal welfare, this tendency is more evident in women  
248 and the more educated. The respondents had a high level of empathy for animal needs and had a good  
249 working knowledge of the living conditions of farm animals. The 68% of respondents said they would pay for  
250 properly certified welfare friendly products, but mostly based on the benefits in terms of product quality and  
251 human health (not animal welfare *per se*). Surveyed consumers also demanded more information and more  
252 regulations about animal welfare. Furthermore, women and those consumers higher educated show more

253 concern regarding animal welfare issues and they are more likely to purchase products labelled “not tested on  
254 animals” (Faver and Muñoz, 2014). In a latest study of Miranda-de la Lama et al. (2018), using a multivariate  
255 analysis reported the existence of three consumer profiles labeled “skeptical”, “concerned” and “ethical”,  
256 which help to explain the association between farm animal welfare attitudes, some demographic variables and  
257 willingness to pay for welfare friendly products. Results from this study may be useful in order to include  
258 animal welfare as an extrinsic quality attribute of animal food products in Mexico and to define a market-  
259 oriented strategy including animal welfare. This study is one of the first to address consumer profiling in  
260 Mexico and Latin America and the findings could have implications for the commercialization of welfare  
261 friendly products in the region. Despite the low demand for animal welfare friendly products in Mexico it is  
262 likely to increase, the main difficulty is that the supply of these products is still limited and is currently  
263 restricted to products with other attributes that includes animal welfare as organic label. In this context, we  
264 need to develop a reliable and effective certification system to properly inform consumers about the welfare  
265 conditions at farm level. On the other hand, it shows that the certifications have gradually become a  
266 mechanism of credibility (Miranda-de la Lama et al., 2018).

267

268 In the case of Chile, previous findings have shown that only 23% of a survey participants admitted to have  
269 sufficient knowledge about products of animal origin, and only 30% declared to be concerned about how  
270 these products were obtained, which are lower percentages than those found in Brazil (56%) and Mexico  
271 (62%) (WAP,2017). Other studies have detected that price was the least important attribute in beef consumers  
272 decision-making process, while quality assurance attribute was the most important (Villalobos et al. 2010),  
273 with an important percentage of people considering that animal welfare can improve quality of products  
274 (WAP, 2017). On the other hand, origin and information regarding animal treatment prior to slaughter are  
275 considered more important than price (Schnettler et al. 2009). But the source of information does not affect  
276 their opinion toward management practices in beef production (Sánchez et al. 2016a). In contrast, beef  
277 consumers are not willing to pay more for such information about animal handling (Schnettler et al. 2009).  
278 The fact is that the purchase decision of Chilean beef consumers is highly influenced by quality assurance  
279 aspects but, meat produced under protocols that consider animal welfare are also highly attractive for this  
280 population (Villalobos et al. 2010). Chilean consumers are opposed to controversial management practices in

281 beef production (Sánchez et al. 2016a) and they are willing to pay a higher price for meat produced under  
282 animal welfare principles (Schnettler et al. 2008). Such management practices includes the lack of pasture  
283 access in confined systems (Sánchez et al. 2016a), which reinforces that they have a positive perception of  
284 meat that comes from animals reared in pasture-based systems (Schnettler et al. 2008). In relation to milk  
285 production, part of the Chilean industry is located in the central region, using mainly confined intensive  
286 systems, while most systems in the south region of the country are based on pasture. The Chilean milk  
287 consumer could show a preference for milk produced in the pasture systems, but it is important to consider  
288 that they might not be aware about potential animal welfare problems, such as lameness, that can be more  
289 present in indoors housed systems (Tadich et al. 2010; Green et al. 2010). The main aspects considered before  
290 purchasing dairy products are fat content and price, but information about the conditions of milk production  
291 and animal welfare are also considered to be important aspects to be included in dairy products (Vargas-  
292 Bello-Pérez et al. 2017).

293

294 In Brazil, recent studies have been suggesting a lack of knowledge of Brazilian citizens about animal  
295 production systems and animal welfare (Bonamigo et al. 2012; de Barcellos et al. 2011; Yunes et al. 2017;  
296 Sánchez et al. 2016b; Hötzel et al. 2017). For example a recent study developed by World Animal Protection  
297 showed that half of a study population (n=1200) declared that they did not read labels of the products they  
298 purchase which includes animal welfare labels (WAP 2017). However, societal concerns regarding the ethical  
299 treatment of animals have raised the interest in the welfare of livestock animals in Brazil (Poletto and Hötzel  
300 2012). Despite Brazilians citizens affirm that they know little about animal production systems, they have  
301 preference for farm animal production systems that provide greater freedom of movement, based on their  
302 perception that this is better for the animal (Yunes et al. 2017). In addition, they reject practices of zero-  
303 grazing and cow-calf separation due to the potential negative effect of such practices on farm animal welfare,  
304 product quality and loss of naturalness (Hötzel et al. 2017). In a recent study, the most cited characteristics of  
305 an "ideal dairy farm" by Brazilians not affiliated with the dairy industry were product quality and animal  
306 management, which included quality of treatment given to animals (Cardoso et al. 2015).

307

308

## 309 **Conclusions and future implications**

310 Since several studies in Latin America have indicated that consumers consider animal welfare when buying  
311 products, a new concept of food quality could be developed that includes the ethical component of production  
312 systems, as an added value. Despite the fact that Mexico, Chile and Brazil belong to the same geographical  
313 region and continent, there are marked differences between these countries in terms of their economical and  
314 geographical characteristics among other factors that characterize their dairy and beef production systems.  
315 Those differences have also a deep impact in the consumer attitudes towards animal production systems.  
316 Quality assurance is still the most important attribute for consumers of the three countries considered in this  
317 review while other attributes such as animal welfare might differ in level of importance. National legislations,  
318 scientific research, education and economic development are aspects that need to be studied and cannot be  
319 worked separately in order to promote and improve consumer attitudes towards animal welfare on dairy and  
320 beef systems. Policy makers and the different stakeholders of the animal production chain should integrate the  
321 knowledge on the different perceptions of consumers in order to adapt their strategy to the different countries.  
322 **It is possible that the improvements in the welfare of farm animals in Latin America (which are a combination**  
323 **of both lawmaking and market-based options) would appear to offer the most viable solution for consumers**  
324 **concerns, with the latter offering those with the highest concern to express their purchasing decisions above**  
325 **the minimum governmental standards implemented.** Further studies that integrate the multi-attribute and the  
326 hierarchical approaches to quality are needed to verify how much more consumers are willing to pay for  
327 welfare friendly products and whether that amount covers the extra costs associated with animal welfare  
328 standards.

329

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**Table 1.** Population aspects and land characteristics of Mexico, Chile and Brazil

	Mexico	Chile	Brazil
Area (km <sup>2</sup> )	1,972,550	756,096	8,515,767
<b><i>Population characteristics</i></b>			
Population	122,435,500	17,948,000	205,573,000
Population density (per km <sup>2</sup> )	57.0	23.0	23.6
Rural (%)	21.9	10.8	15.4
Urban (%)	78.1	89.2	84.6
<b><i>Age composition</i></b>			
0 – 14 years %	29.1	22.1	25.5
>65 years %	6.3	9.3	7.0
<b><i>Land area</i></b>			
Agricultural %	53.1	21.2	32.5
Forest %	33.3	21.9	61.2
Other %	13.7	56.9	6.3
<b><i>Agricultural area</i></b>			
Total 1000 ha	103,166	15,798	275,030
Arable %	24.7	8.3	26.2
<b><i>Permanent</i></b>			
Crops %	2.6	2.9	2.6
Meadows and pastures %	72.7	88.8	71.3

Source: United Nations (2015).

**Table 2.** Local policies on animal welfare available in Brazil, Chile and Mexico.

<i>Country</i>	<i>Law/Regulation number</i>	<i>Law/Regulation issue</i>
Mexico	Ley Federal de Sanidad Animal	Federal Animal Health Act 2007. A number of provisions concerning the welfare of animals used in farming appear at Articles 19 to 23.
	NOM-033-ZOO-1995	Humanitarian care and animal protection during slaughter operations.
	NOM-033-SAG/ZOO-2014	Methods to slaughter domestic and wild animals (including animals for food supply)
	NOM-045-ZOO-1995	Operation of establishments where animals gather for fairs, expositions, auctions, small markets and similar events.
	NOM-051-ZOO-1995.	Ethical standards for the movement and transport of animals.
Chile	Ley N° 20.380 (2009)	Animal Protection Act
	Decreto N° 28 (2013)	Regulation on the protection of animals that provide meat, fur, feathers and other products at the moment of slaughter at industrialized establishments
	Decreto N° 29 (2013)	Regulation on the protection of animals during breeding, commercialization and at other places where animals are maintained.
	Decreto N° 30 (2013)	Regulation on the protection of animals during transport.
Brazil	Decreto N°24.645/1934	Establishes measures for the protection of animals
	Instrução Normativa N° 3 (2000)	Technical regulation on animal stunning methods for humane slaughter of animals destined for human consumption.
	Instrução Normativa N° 56 (2008)	Recommendations on good animal welfare practices for production animals during breeding and transport.

**Table 3.** Scientific literature on consumer attitudes and perceptions towards farm animal welfare in Mexico, Chile and Brazil.

<i>Authors</i>	<i>Title</i>	<i>Methodology</i>	<i>Main results</i>
<i>Mexico</i>			
Santurtún et al. (2012)	Consumers attitudes and perceptions towards sustainable animal production attributes in Mexico City	Questionnaire with 8 closed questions and 26 questions to assess attitudes and perceptions. The questionnaire was applied at markets in one Mexican delegation.	Consumers perceived in first place that local production generates safer products, that it improves animal welfare, and that it protects the environment.
Miranda-de la Lama et al. (2017)	Mexican consumers' perceptions and attitudes towards farm animal welfare and willingness to pay for welfare friendly meat products	Questionnaire with likert type scale responses, which was first validated.	Consumers showed interest in farm animal welfare issues, and their ethical, sociological and economic implications and willing to pay for animal friendly products.
Miranda-de la Lama et al. (2018)	Consumer attitudes towards animal welfare friendly products and willingness to pay: An exploration of Mexican market segments	Questionnaire with likert type scale responses, which was first validated.	Mexican consumers can be profiled as sceptical, concerned and ethical, based in how they perceive animal welfare and their willingness to pay for welfare friendly products.
<i>Chile</i>			
Schnetler et al. (2008)	Consumer perception of animal welfare and livestock production	Personal interviews, closed questions questionnaire.	Consumers show a high willingness to pay for animal welfare attributes

Schnettler et al. (2009)	in the Araucania Region, Chile Consumer willingness to pay for beef meat in a developing country: The effect of information regarding country of origin, price and animal handling prior to slaughter	Personal interviews, closed questions questionnaire.	Animal welfare is perceived as a desirable condition, but consumers are not willing to pay significantly more when buying meat in order to gain information about animal handling.
Morales et al. (2013)	Beef acceptability and consumer expectations associated with production systems and marbling	Panel with 204 consumers from two Chilean cities	Three types of consumers were identified, 'lean beef lovers', 'high expectation consumers' and 'grass-fed beef lovers'
Vargas-Bello-Pérez et al. (2017)	Chilean consumers' perception about animal welfare in dairy production systems: short communication	Face-to-face interview	Most participants were interested in receiving more information on animal welfare, and that labelling of dairy products should include information on animal welfare and production conditions. Willingness to pay more for animal friendly products was also observed.

*Brazil*

Velho et al. (2009)	Disposition to buy certificated beef by consumers from Porto Alegre	Application of questionnaires as interviews at one supermarket chain in Porto Alegre	Willingness to pay for certifications (i.i. type of production system, organic, among other) of beef products is low probably associated to income ranges
Maysonnave et al. (2014)	Quality perception of beef with brand in the south of Brazil	Structured questionnaire applied to consumers, butchers, managers	Different stakeholders had similar understanding about meat quality. Meat aspect and meat surveillance information were most associated

Queiroz et al. (2014)	Consumer perception about welfare of livestock in Fortaleza, Ceará, Brazil	and farmers. Survey with closed questions	with product quality Most consumers do not have sufficient knowledge on issues related to animal welfare, but believe that different rearing methods can result in improvements in the final product.
Bruhn et al. (2015)	Socio-economic factors associated with perception and attitude of consumers of meat with certification of origin	Interviews with a structured questionnaire (36 questions)	Consumers with higher education and income were more knowledgeable about beef traceability certification.
Hotzel et al. (2017)	Citizens' views on the practices of zero-grazing and cow-calf separation in the dairy industry: does providing information increase acceptability?	Surveyed a convenience sample. Use of closed questions	Citizens reject zero grazing and cow-calf separation in dairy systems. The main reasons were the reduction in welfare, product quality and naturalness.
Yunes et al. (2017)	Brazilian citizens' opinions and attitudes about farm animal production systems.	Survey with closed and open questions. Each participant was shown pictures representing two of five possible major food animal industries.	Respondents preferred production systems that provide greater freedom of movement, which aligned with their perception that these systems are better for the animal.
<i>Mexico, Chile and Brazil</i>			
World Animal Protection (2017)	Blind consumption: Consumer perceptions on animal welfare.	Survey with closed questions applied to consumers at supermarkets.	Growing consumer concern in terms of animal welfare issues and market implications.