

# Farm Animal Welfare Influences on Markets and Consumer Attitudes in Latin America: The Cases of Mexico, Chile and Brazil

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

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worked separately in order to promote and understand consumer attitudes towards dairy and beef systems, such as geography, economic development, and politics.

**Keywords** Farm animal welfare · Livestock production · Consumer attitudes · Latin America

## Introduction

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

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

Recent scientific evidence in the region indicates that Latin American consumers are becoming more concerned about animal welfare and husbandry systems, and in many cases, animal welfare is considered as a quality assurance of food of animal origin (Webster 2001; Queiroz et al. 2014; Vargas-Bello-Pérez et al. 2017; Miranda-

de la Lama et al. 2017). Urbanization and media, influences of civil society organizations and increase in society's education and economic level are the reasons for an increased interest in animal welfare (Koknaroglu and Akunal 2013). Furthermore, as the average income and overall wealth is generally associated to increased expectations regarding livestock husbandry conditions and animal welfare (Verbeke 2009), it can be expected that social demand regarding animal welfare and the associated products will increase in Latin American countries. On the other hand, there are many differences (i.e., geography, socio-demographics, politics, and economic situation) among Latin American countries, which have a great potential to interfere on the opinion of consumers and their attitudes towards animal production systems. Mexico, Chile and Brazil are all member countries of the World Organisation for Animal Health (OIE) and adhered to the animal welfare definition provided in the Terrestrial Animal Health Code: "Animal welfare means how an animal is coping with the conditions in which it lives. An animal is in a good state of welfare if it is healthy, comfortable, well nourished, safe, able to express innate behaviour, and if it is not suffering from unpleasant states such as pain, fear and distress" (OIE 2016). Similarly they have become referents in the Latin American region in terms of productivity of scientific publications, being the three in the top five for the region and Brazil in the 6th place worldwide. Despite the high scientific productivity in the animal welfare topic, only few studies have included consumers' attitudes and perceptions. In this context, we described some production aspects related to livestock production, consumer preference, and some political aspects of Mexico, Chile and Brazil (the most stable countries in terms of livestock industry). This perspective paper aims to discuss these aspects and associate them with the results of published studies on consumer attitudes towards livestock production and welfare. The conclusions should allow policy makers and different stakeholders of the animal production chains to adapt their animal welfare strategy to the situation encountered in the different countries.

## Livestock Production and Consumption

Latin America is an important region for livestock production and global trade of animal products. According to FAO (2014), Brazil and Mexico have the greatest numbers of livestock among Latin American countries. Brazil has around 213 million, while Mexico reported 39 million heads of cattle and Chile has over 3.7 million heads of cattle (ODEPA 2015). In addition, Brazil is the top meat producer in Latin America and shares with Mexico the first positions in milk production (United Nations 2015). In a recent publication, beef and veal consumption in Brazil is reported as 24.2 kg/capita, while it is 15.0 kg/capita in Chile and 8.8 kg/capita in Mexico (OECD 2017). Between these three countries, Brazil is also the highest milk consumer (124.6 kg/capita), followed by Mexico (115.2 kg/capita) and Chile (93.0 kg/capita) (FAO 2011). These consumptions might be related to living standards, diet, livestock production and consumer prices (OECD 2017). Land and agricultural areas (Table 1) are important factors needed to be considered for consumer perception studies since they have a deep impact on animal production systems, especially because these conditions may influence the type of production

**Table 1** Population aspects and land characteristics of Mexico, Chile and Brazil. *Source:* United Nations (2015)

	Mexico	Chile	Brazil
Area (km <sup>2</sup> )	1,972,550	756,096	8,515,767
<i>Population characteristics</i>			
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
<i>Age composition</i>			
0–14 years %	29.1	22.1	25.5
> 65 years %	6.3	9.3	7.0
<i>Land area</i>			
Agricultural %	53.1	21.2	32.5
Forest %	33.3	21.9	61.2
Other %	13.7	56.9	6.3
<i>Agricultural area</i>			
Total 1000 ha	103,166	15,798	275,030
Arable %	24.7	8.3	26.2
<i>Permanent</i>			
Crops %	2.6	2.9	2.6
Meadows and pastures %	72.7	88.8	71.3

(i.e., grazing vs. confinement), which will be preponderant in each country according to their geography and land distribution. Millman (2009) suggested that attitudes towards farm animals from people living in urban areas could be different since they have less direct experience with agriculture. Another important aspect in Latin America and the Caribbean region is that the per capita gross annual income (GNI) was doubled between 2000 and 2012 (United Nations 2015; FAO 2014). An interesting point that deserves some attention is the external funding that Latin American countries received. The percentage of official development assistance (ODA) to agriculture, forestry and fisheries to the entire region is about 8.5% according to FAO (2014). For example in Brazil, more than 1.9% of ODA went to agriculture whereas Chile and Mexico received 1 and 0.2% respectively. As the general global trend, Latin America is becoming more urban. According to FAO (2014), over the past 50 years, the rural population in this region has gradually declined mainly due to the persistent economic inequality between urban and rural areas.

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

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

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

Brazil is one of the largest producers and exporters of animal origin products in the world (FAO 2014), which involves the country to adapt some quality standards required by internal and external consumers and clients to stay competitive at world level. The importance of animal production on the economic performance and towards generating jobs is irrefutable. Brazilian beef production in 2023 is estimated in 10,935 million tons of meat, representing an increase of almost 29% relative to 2013, and 20% of the global market share (Lobato et al. 2014). Brazilian beef cattle production can be considered as “grass-based systems”, since all breeding and rearing are made on pastures, and only 7.5%, or even less, of the slaughtered cattle are finished on feedlots, and for a short period of time (Lobato et al. 2014). Brazilian consumers prefer products with a label that ensure tenderness of the meat (Saab 1999) and are willing to pay more to buy those products (Velho et al. 2009). Brazil is the fourth largest milk-producing country in the world (FAO 2013). In the south of the country, milk is mainly produced in small holding farms

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

Country	Law/regulation number	Law/regulation issue
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 19–23
	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 no. 20.380 (2009)	Animal Protection Act
	Decreto no. 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 no. 29 (2013)	Regulation on the protection of animals during breeding, commercialization and at other places where animals are maintained
	Decreto no. 30 (2013)	Regulation on the protection of animals during transport
Brazil	Decreto no. 24.645/1934	Establishes measures for the protection of animals
	Instrução Normativa no. 3 (2000)	Technical regulation on animal stunning methods for humane slaughter of animals destined for human consumption
	Instrução Normativa no. 56 (2008)	Recommendations on good animal welfare practices for production animals during breeding and transport

(IBGE 2009), where milk production may be essential for the maintenance of family farming in the region (Balcão et al. 2016). Interestingly, in recent years there has been an increase in the number of large-scale dairy farms which are characterized by a large number of animals in milk production (IBGE 2009).

### Farm Animal Welfare in Mexico, Chile and Brazil

All three countries have undertaken scientific research in order to support local policy, which is aligned with OIE farm animal welfare standards for local animal welfare laws and regulations (Table 2). Mexico has the second largest economy in Latin America, behind Brazil. Mexico has significant beef production and is one of the highest eleven beef exporters in the world (USDA 2016). The implementation of The North American Free Trade Agreement (NAFTA), along with a series of open macroeconomic policies during the late 1990s and 2000s, led Mexico's economy into steady growth. However, the dependence of Mexico on trade with the United States of America has a large impact in the animal production sector, reflecting in an intensification of animal production systems. Since the late 1990s, Mexico has developed a series of comprehensive laws, regulations, and standards and signed

many international agreements concerning animal welfare issues. Yet for all their existence and despite government efforts, the regulations continue to lack effective enforcement and surpassed by the productive reality (Norman and Hernández 2005). Mexico has been slow to update its legal regulations on farm animal welfare, which includes some guidelines on animal transport, stunning and slaughter throughout the pre-slaughter supply chain (Miranda-de la Lama et al. 2012). Nevertheless, Mexican citizens are currently developing a sense of growing concern about the protection and welfare of animals (Aguirre and Orihuela 2010). Additionally, Mexican empathy towards animal welfare could be a strategy for re-directing the frustration for solving issues of inequity justice and social exclusion (see Sandoval-Cervantes 2016). The latter could be related to security issues; since Mexico is facing one of the worst security crisis, institutional credibility and impunity of the contemporary history, in which corruption and the apparent governmental indolence have deteriorated the social confidence towards Mexican government (Bailey 2006). In the face of a possible increasing demand in Mexico for products that take into account animal welfare and higher quality products, the supply chain (i.e., farmers, abattoirs, dairy and meat industries, retailers) should guarantee the origin of the products by certification. However, debeaking, detoeing, tail-docking, tooth pulling, castration, and dehorning of livestock without anaesthetic are legal in Mexico, as is confinement in gestation crates and battery cages (WAP 2014). Therefore, it is essential to develop own methods based in Mexican reality for assessing farming systems and certifying organizations that guarantee the authenticity of animal welfare friendly products. At the same time, it will be necessary to inform consumers and convince the meat and dairy industry that the ethical value of a product is an element of growing economic importance and a business opportunity (Miranda-de la Lama et al. 2014).

Chile was the first neoliberal policy experiment in Latin America, with privatization, deregulation and export-orientation (Harvey 2007). With only a small domestic market, often cited as one of the most open and free market economies in the world, it has been argued that market actors have been central in the recent raise of ethical consumption (Kane et al. 2007). Previous publications stated that, during the military coup in 1973, the regime de-regulated the national economy and sought to integrate Chile into global trade (Cademartori 1998) as well as banned unions, discouraged co-operatives and policed civic political expression. This context has led to a limited extend of civil society activity in Chile even today, which can explain why Chilean consumers are recently demanding for changes not only in their politics but also in their productive sectors such as livestock production (Ariztía et al. 2014). Since 2009, Chile has an Animal Protection Law (Ministerio de Salud 2009), which provides a frame work for the welfare of various species involved in different activities (i.e., education, research, entertainment and animal production systems). Later on in 2013, three complementary regulations for animal production systems arose from this law: (1) the protection of farm animals within an industrial system; (2) the protection of animals destined for human consumption during slaughter; and (3) the protection of farm animals during transport (Law 20.380; decree laws 28, 29 and 30) (Ministerio de Salud 2009). In general, these regulations are in accordance with the animal welfare strategies of the world

organization for animal health (OIE) and have facilitated compliance with international markets requirements, considering that the country exports beef to the European Union. On the other hand, they respond to an increasing demand from consumers for accessing products of animal origin with “animal welfare standards”, or produced under “ethical management” (Schnettler et al. 2008).

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

### **Consumer’s Attitudes Towards Farm Animal Welfare**

Individuals may have different attitudes depending on whether they are acting in their role as a citizen or a consumer. As citizens, they report a high level of concern about modern production systems, and having welfare friendly production systems, as important. However, as consumers they have other priorities when it comes to purchasing products (Clark et al. 2016). Over the past years, various accounts of ethical consumption have been the central to mediating the ethical relationship between the consumer and the consumed (Manyukhina 2017). Many studies especially from Europe have demonstrated a strong consumer interest in farm animal welfare. This interest has influenced consumer attitudes, especially in terms of their willingness to pay and purchase behaviour. For example, in the Netherlands the differentiation in terms of animal welfare standards and price in the meat sector play an important role in satisfying consumer expectations (de Jonge et al. 2015). It has been shown that European consumers are willing to pay more for food produced under animal welfare standards (Zander and Hamm 2010). However, differences are also found between consumers from different countries, indicating that consumer behaviour regarding animal-friendly products is affected by cultural differences and consumers’ trust in farmers, which can show, for example, differences between northern European and southern European countries (Nocella et al. 2010). Therefore, consumer attitudes towards welfare-friendly products are changing around the world, especially at emerging markets of Asia, Africa and Latin



America. Furthermore, there are currently no national specific regulations governing the essential requirements for certification of welfare friendly products that could meet the higher expectations of Latin American consumers (Table 3). Although some food industries and supermarket chains have developed voluntary codes of practice and animal welfare standards, our revision suggests that consumer demand for these products is not always being satisfied.

In Mexico, there are some recent publications reporting consumer opinions and attitudes towards animal welfare. Healthy food and environmental protection are attributes more valued than animal welfare (Santurtún Oliveros et al. 2012) probably due to the change of Mexican consumer lifestyle, which includes healthier eating and interest for “natural” products (Salcido 2011). However, it is expected that Mexican consumers concerns toward animal welfare will increase with the knowledge about the intensification of the food production systems, as previous mentioned. For example, a recent study of Miranda-de la Lama et al. (2017), Mexican consumers appear to be interested in farm animal welfare, this tendency is more evident in women and the more educated. The respondents had a high level of empathy for animal needs and had a good working knowledge of the living conditions of farm animals. The 68% of respondents said they would pay for properly certified welfare friendly products, but mostly based on the benefits in terms of product quality and human health (not animal welfare per se). Surveyed consumers also demanded more information and more regulations about animal welfare. Furthermore, women and those consumers higher educated show more concern regarding animal welfare issues and they are more likely to purchase products labelled “not tested on animals” (Faver and Muñoz 2014). In a latest study of Miranda-de la Lama et al. (2018), using a multivariate analysis reported the existence of three consumer profiles labeled “skeptical”, “concerned” and “ethical”, which help to explain the association between farm animal welfare attitudes, some demographic variables and willingness to pay for welfare friendly products. Results from this study may be useful in order to include animal welfare as an extrinsic quality attribute of animal food products in Mexico and to define a market-oriented strategy including animal welfare. This study is one of the first to address consumer profiling in Mexico and Latin America and the findings could have implications for the commercialization of welfare friendly products in the region. Despite the low demand for animal welfare friendly products in Mexico it is likely to increase, the main difficulty is that the supply of these products is still limited and is currently restricted to products with other attributes that includes animal welfare as organic label. In this context, we need to develop a reliable and effective certification system to properly inform consumers about the welfare conditions at farm level. On the other hand, it shows that the certifications have gradually become a mechanism of credibility (Miranda-de la Lama et al. 2018).

In the case of Chile, previous findings have shown that only 23% of a survey participants admitted to have sufficient knowledge about products of animal origin, and only 30% declared to be concerned about how these products were obtained, which are lower percentages than those found in Brazil (56) and Mexico (62%) (WAP 2017). Other studies have detected that price was the least important attribute in beef consumers decision-making process, while quality assurance attribute was

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

Authors	Title	Methodology	Main results
<i>Mexico</i>			
Santurtún Oliveros 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>			
Schnettler et al. (2008)	Consumer perception of animal welfare and livestock production in the Araucania Region, Chile	Personal interviews, closed questions questionnaire	Consumers show a high willingness to pay for animal welfare attributes
Schnettler et al. (2009)	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'

**Table 3** continued

Authors	Title	Methodology	Main results
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
<i>Brazil</i>			
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 and farmers	Different stakeholders had similar understanding about meat quality. Meat aspect and meat surveillance information were most associated with product quality
Queiroz et al. (2014)	Consumer perception about welfare of livestock in Fortaleza, Ceará, Brazil	Survey with closed questions	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
Hötzel 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

**Table 3** continued

Authors	Title	Methodology	Main results
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

the most important (Villalobos et al. 2010), with an important percentage of people considering that animal welfare can improve quality of products (WAP 2017). On the other hand, origin and information regarding animal treatment prior to slaughter are considered more important than price (Schnettler et al. 2009). But the source of information does not affect their opinion toward management practices in beef production (Sánchez et al. 2016a). In contrast, beef consumers are not willing to pay more for such information about animal handling (Schnettler et al. 2009). The fact is that the purchase decision of Chilean beef consumers is highly influenced by quality assurance aspects but, meat produced under protocols that consider animal welfare are also highly attractive for this population (Villalobos et al. 2010). Chilean consumers are opposed to controversial management practices in beef production (Sánchez et al. 2016a) and they are willing to pay a higher price for meat produced under animal welfare principles (Schnettler et al. 2008). Such management practices includes the lack of pasture access in confined systems (Sánchez et al. 2016a), which reinforces that they have a positive perception of meat that comes from animals reared in pasture-based systems (Schnettler et al. 2008). In relation to milk production, part of the Chilean industry is located in the central region, using mainly confined intensive systems, while most systems in the south region of the country are based on pasture. The Chilean milk consumer could show a preference for milk produced in the pasture systems, but it is important to consider that they might not be aware about potential animal welfare problems, such as lameness, that can be more present in indoors housed systems (Tadich et al. 2010; Green et al. 2010). The main aspects considered before purchasing dairy products are fat content and price, but information about the conditions of milk production and animal welfare are also considered to be important aspects to be included in dairy products (Vargas-Bello-Pérez et al. 2017).

In Brazil, recent studies have been suggesting a lack of knowledge of Brazilian citizens about animal production systems and animal welfare (Bonamigo et al.

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

## Conclusions and Future Implications

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

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