In search of a sustainable alternative for meat production: understanding the purchase intention of meat from transhumance origin

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Abstract

In recent years, meat production and consumption has become a topic of intense debate for environmental, animal welfare and health reasons. Research on more sustainable alternatives to meat production has increased. Our goal is to gain insight into the purchase of meat from transhumance livestock and to explore the main factors driving this process. This type of meat is more respectful towards the environment and animal welfare, provides financial stability for many rural families and helps preserve an activity that is part of the cultural heritage in rural areas. From a methodological point of view, we have adopted the theoretical alphabet theory model proposed by Zepeda and Deal in 2009 to explain sustainable purchase behavior. For this purpose, we created two different models, one for lamb meat and one for beef meat. The data come from an online survey of Spanish meat consumers. We applied a structural equation modeling technique to test the suggested model and hypothesis. The results allow us to conclude that the alphabet theory is a suitable theory for our data. The level of knowledge on transhumance and contextual factors, such as the content of fat or the type of meat, impact the creation of attitudes towards this type of livestock farming, but demographic variables do not. In both models, buying meat with a designation of origin and buying meat at specialty retailers are habits that positively influence purchase intention. Our results are highly relevant to help meat of transhumant origin reach the markets and to differentiate it from other products.

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Introduction

Meat consumption and production has become a topic of intense debate among scientists, politicians and society as a whole; not only due to the livestock farming environmental impact, as it is a significant source of greenhouse gasses (Rojas-Downing *et al.*, 2017; FAO, 2021), or due to the high water consumption it entails (Reynolds *et al.*, 2010), but also because of the welfare conditions that the animals are raised in (Dawkins, 2017).

Different solutions have been proposed to address these challenges. Some of them focused on decreasing the consumption of meat, such as vegetarian, flexitarian or reducetarian diets (Cheah *et al.*, 2020; Röös *et al.*, 2020; Verain *et al.*, 2022) or the development of non-meat analogues like the cultured meat (Mancini and Antonioli, 2019; Gere *et al.*, 2020). However, consumers are not always ready to adapt to these types of diets or to decrease meat consumption (Campbell-Arvai, 2015; De Groeve and Bleys, 2017; Weingarten *et al.*, 2022). Furthermore, it is probably not an option for many rural areas that depend on livestock farming. Livestock farming is essential for the sustainable development of agriculture (FAO, 2016), it provides financial stability for many families (Upton, 2004; Alary *et al.*, 2011), and also greatly contributes to settle population in rural areas. The latter is a deterrent for one of today's main social, economic, environmental and cultural issues: depopulation (Terres *et al.*, 2015; Lasanta *et al.*, 2017).

Therefore, it is important to offer alternatives to meat producers and consumers that guarantee the sustainability of this important sector. One of these alternative methods is the pasture-based livestock production system, in which animals spend a majority of the growing season outside and foraging for significant portions of their diets (Conner *et al.*, 2008*a*).

One step further in extensive farming, that is in line with sustainability and part of the cultural heritage of rural areas, is transhumance. Transhumance is a form of pastoralism which consists of the seasonal droving of livestock along migratory routes. Throughout Europe, more than 4 million hectares of agricultural land depend on transhumance (Bunce *et al.*,

2004). Many valuable cultural landscapes, rural communities, habitats and species are directly linked to transhumance and are vital for tourism in mountain regions. Moreover, transhumance plays a key role in maintaining biodiversity in mountain ecosystems through Europe. However, despite this practice being present in many European countries from Balkans to Scotland, it is a declining activity (Olea and Mateo-Tomás, 2009). Social and economic changes are driving forces behind the decline of transhumance, which in turn has key implications for the sustainability of mountain ecosystems and threatens biodiversity (Carmona *et al.*, 2013; Oteros-Rozas *et al.*, 2013). The tough requirements of this practice and its limited profitability hinder generational replacement, and therefore, its continuity. It is therefore essential to improve the profitability of products obtained from this activity in order to favor its preservation.

Our study focuses in Spain, that holds the largest grazing areas of high nature value farmlands in Europe (Paracchini *et al.*, 2008; Kerven and Behnke, 2011) including the last long distance (>100 km) transhumant drove roads still in use (Oteros-Rozas *et al.*, 2013).

Most of today's transhumant livestock in Spain consists of sheep and cows (Olea and Mateo-Tomás, 2009) and one of the main products obtained from this livestock is meat (Aguilera-Alcalá *et al.*, 2022). However, the lack of differentiation of pastoral systems in general and transhumance in particular makes difficult for consumers to find them in the market.

A broad body of research revealed the importance that consumers place on meat production that is respectful towards the environment and animal welfare (Bernués *et al.*, 2003; Pohjolainen *et al.*, 2016; Merlino *et al.*, 2018; Sonoda *et al.*, 2018; Armstrong Soule and Sekhon, 2019) or the origin (Gracia and De-Magistris, 2013; Bernabéu *et al.*, 2018; De Boer and Aiking, 2022). Some studies reveal the convergence of all these requirements in the same consumer segment (Thilmany *et al.*, 2006; Merlino *et al.*, 2017; Ellies-Oury *et al.*, 2019; Eldesouky *et al.*, 2020).

There are different quality marks in the European Union that can be used to differentiate meat such as the protected geographic indication or the organic production label (Ruiz *et al.*, 2021). However, there is no quality brand that identifies and differentiates products derived from transhumance.

According to Grunert *et al.* (2018), the essential and achievable aspects for consumers in meat production are: not keeping animals locked up, limiting their transportation to under 4 h, achieving production with zero carbon footprint and using manure for fertilization. Meat from transhumance livestock meets the properties of being produced in a sustainable way, from an environmental and animal welfare point of view, as well as being closely linked to the origin.

However, there is still limited knowledge on the factors that could affect the intention to purchase meat from transhumance livestock farming, and thus favor an increased profitability for this activity in order to prevent its abandonment. To the best of our knowledge, no other study has investigated the consumer interest and purchase intention variables for meat from transhumance livestock.

The aim of this study is to gain insight into the purchase of meat from transhumance livestock by consumers and to explore the main factors driving this process. Furthermore, the study is an attempt to progress in the empirical research of the alphabet theory by Zepeda and Deal (2009). For this purpose, we created two different models, one for lamb and one for beef, two of the main livestock species that are still bred using transhumance in

Spain. The consumer behavior pattern for both types of meats is different and depends on the appearance and sensory properties of the meat, the socio-demographic characteristics of consumers and psychological and marketing aspects (Font-i-Furnols and Guerrero, 2014; Escriba-Perez *et al.*, 2017).

Conceptual model: alphabet theory

The theoretical model this study is based on is the alphabet theory (Zepeda and Deal, 2009), which is an attempt to explain pro-environmental behavior from a combination of the value-belief-norm (VBN) (Stern *et al.*, 1999) and attitude-behavior-context (ABC) (Guagnano *et al.*, 1995) theories in a single framework. Explicitly linking the VBN and ABC theories and introducing the elements of demographics (D), knowledge (K), information seeking (IS) and habit (H) into this theoretical framework results in the alphabet theory by Zepeda and Deal (2009).

Some researchers have successfully used the alphabet theory as a framework to analyze consumer behavior towards environmentally friendlier food (Feldmann and Hamm, 2015; Schäufele and Hamm, 2017; Rivaroli *et al.*, 2020; Stampa *et al.*, 2020; Hempel *et al.*, 2021; Rondoni and Grasso, 2021), but very little empirical research has been conducted to validate the theoretical model. As far as we know, only Manohar *et al.* (2021) have recently developed a model based on the alphabet theory in the field of new healthy foods, but it is only an approximation. So, to the best of our knowledge, our study is the first attempt to empirically apply the alphabet theory to a sustainable behavior like the intention to purchase meat from transhumance livestock.

The model is shown in Figure 1. The only difference with the original model is the absence of the 'information seeking' variable, which is treated in the literature as the tendency of consumers to check and read labels (Rondoni and Grasso, 2021). As identifying meat from transhumance livestock is not possible in markets, we have not measured this variable.

Definition of variables

In the proposed model, there are three latent or unobservable variables (represented by ovals): attitudes, context and habits, which are shaped using observable variables or indicators measured in the survey. Next, we describe the theoretical framework on which the choice of variables is based.

Attitudes
Attitudes are relatively stable evaluative judgments about the aspects of a person's experience that range from negative to positive and are influenced by situational factors (Lindgren *et al.*, 2021).

Values, beliefs and norms shape consumer attitudes towards certain types of food and motivate or discourage consumers from buying them (Stern *et al.*, 1999).

The most frequently named attitudes that result in local or organic food purchases are related to better quality and taste, as well as more altruistic attitudes like the demand for public benefits related to job and income generation in the community (Adams and Adams, 2011; Gracia *et al.*, 2011; Feldmann and Hamm, 2015). In the case of meat, Wong and Aini (2017), using the theory of planned behavior, note that attitudes towards organic meat are an influential factor regarding the intention to purchase organic meat, although behind others. Based on this
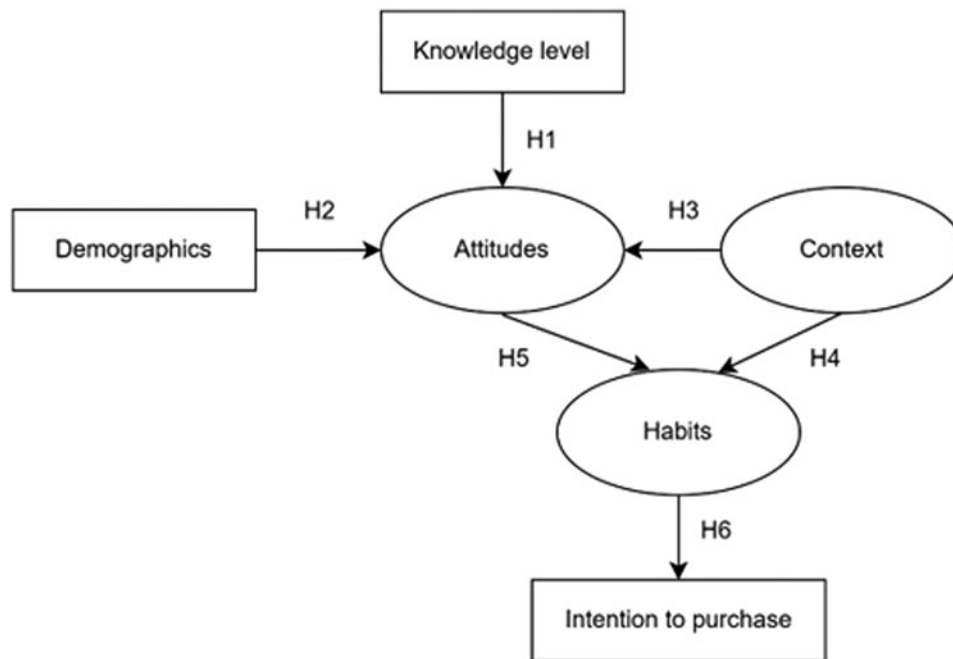
Fig. 1. Conceptual model to explain the intention to purchase meat from transhumance livestock.

literature, we have considered as 'attitudes' different beliefs related to intrinsic characteristics of transhumance meat, and to external attributes like local origin or the promotion of employment. The measurement of these attitudes will be described in Section 'Materials and methods'.

Context

Contextual factors are external conditions which mediate between attitudes and behavior, and may also change them (Schäufele and Hamm, 2017). The conditions that most influence consumers are price, origin, production system, store type, taste and availability, but so do promotion and advertising, packaging or time pressure. In our model, we suggest measuring context through nine observable indicators. We have specifically considered (1) price, that is commonly used in most meat consumer studies (Ellies-Oury et al., 2019; Mandolesi et al., 2020; Rabadán et al., 2020; Lanfranchi and Giannetto, 2021). Regarding the production system, we considered the (2) organic/sustainable production (Bernués et al., 2012; Pohjolainen et al., 2016; Merlino et al., 2018; Armstrong Soule and Sekhon, 2019), and two indicators related to convenience: (3) ease of cooking and (4) shelf life (Bernués et al., 2012; Grebitus et al., 2013; Mandolesi et al., 2020; Baviera-Puig et al., 2021; Kantono et al., 2021). Among sensory attributes, actual taste appears to be the most important. However, in a real purchase situation it is not always possible to taste the product, so taste yields to appearance based on a visual cue such as marbling (Mandolesi et al., 2020; Stampa et al., 2020). Based on these indications we considered (5) taste, (6) fat, (7) appearance, (8) type of meat and (9) nutritional value (Evans et al., 2011; Morales et al., 2013; Zanoli et al., 2013; Wong and Aini, 2017; Apostolidis and McLeay, 2019; Alessandrini et al., 2021).

Habits

Habits are a repetitive behavior and play a key role in food purchasing decisions. Consumption frequency, responsibility for food purchases and place of purchase are the main habits that influence the likelihood to purchase and willingness to purchase pasture-raised products (Stampa et al., 2020).

In line with these authors, in our study we considered meat consumption frequency, place of purchase and food purchasing responsibility as the main habits. We also considered being frequent organic and/or designation of origin meat purchasers as possible habits, as they are, as stated in the introduction, two attributes of great importance for a sustainable consumers' choice of purchase.

Usually, higher consumption frequency entails greater knowledge of the product, and thus increased purchase intention. However, regarding meat, there is an ambivalence between enjoying the meat and an aversion to harming the animal (Hartmann and Siegrist, 2020; Khara et al., 2021). For example, Verbeke and Vackier (2004) found that concerned meat consumers noticeably lowered their meat consumption frequency. Also, noteworthy and in the same line is the study by Verain et al. (2022), which shows that consumers who have undertaken flexitarian diets are more concerned about animal welfare and the environment. Other studies show that consumers with a greater feeling of guilt choose to replace conventional meat with organic meat (Nguyen et al., 2021). However, Kim and Yoon (2021) established that most consumers do not decrease their meat consumption because it is an essential element of a healthy diet.

The place of purchase has a long history of influencing consumer quality perception (Grunert, 2006; Merlino et al., 2018). Verbeke and Vackier (2004) segmented a sample of Belgian consumers based on their involvement with meat and found that those who were more concerned or cautious about meat were more likely to purchase meat from places other than supermarkets. Bozzo et al. (2019), in their study on meat consumption in Italy, established that the place of purchase was the variable that most impacted purchase price. Czine et al. (2020) considered the place of purchase to be among the most important variables for meat consumers.

Table 1. Definition of the variables included in the survey

Variable name	Scale	Measurement
Attitudes	Likert scale (1–5)	
Attitude 1		Transhumance certification would give me security
Attitude 2		Transhumance meat has higher quality
Attitude 3		Transhumance meat has better taste, texture, etc.
Attitude 4		Transhumance labeling make sure that the meat is from local origin
Attitude 5		Transhumance help promote work in that area
Attitude 6		Transhumance promote national products and not imports
Context	Likert scale (1–5)	
Nutritional value		When buying meat, how important is the nutritional value
Aspect		When buying meat, how important is the aspect
Taste		When buying meat, how important is the taste
Organic		When buying meat, how important is the organic label
Fat		When buying meat, how important is the fat content
Type of meat		When buying meat, how important is the type of meat
Price		When buying meat, how important is the price
Ease of cooking		When buying meat, how important is the ease of cooking
Shelf life		When buying meat, how important is the shelf life
Habits		
Responsible purchasing	Dummy (1–2)	Are you the responsible for home purchasing? (1: No; 2: Yes)
Place of purchase	Scale (1–3)	Where do you usually buy beef/lamb meat? (1: Supermarkets; 2: Specialty retailers; 3: Others)
Purchase frequency	Scale (1–4)	How often do you buy beef/lamb meat? (1: Less than once a month; 2: 1–2 times a month; 3: 1–2 times a week; 4: 3 times a week or more)
Purchase DO	Scale (1–3)	Do you buy certified PDO meat? (1: No; 2: I don't know; 3: Yes)
Purchase organic	Scale (1–3)	Do you buy certified organic meat? (1: No; 2: I don't know; 3: Yes)
Knowledge	Likert scale (1–5)	Among my circle of friends, I'm one of the 'experts' on transhumance
		I know pretty much about transhumance
		I do not feel very knowledgeable about transhumance
		Compared to most other people, I know more about transhumance
Individual characteristics		
Gender	Dummy (1–2)	1: Female; 2: Male
Age	Scale (1–5)	1: 18–24 yr; 2: 25–34 yr; 3: 35–49 yr; 4: 50–64 yr; 5: 65 yr or over
Level of studies	Scale (1–4)	1: Primary education; 2: Secondary education; 3: University student; 4: University graduate
Family income	Scale (1–5)	1: <€1000; 2: €1000–1999; 3: €2000–3499; 4: €3500–4999; 5: >€5000
Type of habitat	Dummy (1–2)	1: Rural (<30,000 inhabitants); 2: Urban (≥30,000 inhabitants)
Purchase intention	Scale (1–10)	Intention to buy beef/lamb from transhumance origin

Finally, according to Stampa *et al.* (2020), being in charge of purchasing the food is also a factor that impacts the likelihood to purchase and willingness to pay pasture-raised products. Thus, all these variables have been included in the survey (Table 1).

Knowledge

Consumer's knowledge of a product category holds a special position in consumer research and three categories have been defined: subjective, objective and experience. It is likely that, subjective knowledge, defined as what the consumer thinks he or she knows, is a more important motivation of the behavior surrounding product purchase and use than the other (Flynn and Goldsmith, 1999).

A broader knowledge of a subject affects attitudes towards it through the formation of certain beliefs and prejudgments, as well as comparing whether the products align with personal and social values and norms. In turn, attitudes affect further information seeking or initiate it in the first place. Thus, greater knowledge about organic production practices, for example,

Table 2. Socio-demographic data and purchasing habits of the samples

Variable	General	Beef consumers	Lamb consumers
Gender			
Male	44.9%	44.3%	48.9%
Female	54.0%	54.6%	50.0%
Refusal to answer	1.0%	1.1%	1.1%
Age (years)			
18–24	18.2%	18.4%	18.6%
25–34	25.5%	25.4%	25.8%
35–49	22.6%	22.2%	23.1%
50–64	30.4%	30.5%	29.2%
65 or over	0.3%	0.3%	0.4%
I would rather not answer	3.1%	3.2%	3.0%
Level of monthly income			
<€1000	4.4%	4.6%	5.7%
€1000–1999	24.7%	23.5%	22.7%
€2000–3499	29.6%	30.0%	30.3%
€3500–4999	19.0%	19.2%	19.7%
>€5000	7.0%	7.0%	6.1%
Refusal to answer	15.3%	15.7%	15.5%
Level of education			
Primary education	0.8%	0.5%	1.1%
Secondary education	11.7%	11.9%	10.2%
University student	14.8%	15.4%	15.2%
University graduate	69.6%	69.5%	71.2%
I would rather not answer	3.1%	2.7%	2.3%
Habitat			
Rural	16.9%	16.9%	15.2%
Urban	83.1%	83.1%	84.8%
Responsible for purchasing	77.7%	77.8%	78.0%
Place of purchase			
1: Supermarkets	49.0%	50.9%	48.9%
2: Specialty retailers	51.0%		
Frequency of purchase			
1: Less than once a month		5.6%	41.2%
2: 1–2 times a month		38.9%	42.3%
3: 1–2 times a week		45.3%	15.3%
4: 3 times a week or more		9.9%	1.1%
Purchase of PDO meat	35.1%	35.7%	31.8%
Purchase of organic meat	17.9%	18.9%	20.1%
Intention to purchase transhumance meat (average)		7.88 (1.97)	7.44 (2.15)
Knowledge level about transhumance (average)	10.67	10.86	10.63
Context (average)			
Taste	4.34	4.33	4.34
Aspect	4.21	4.20	4.21

(Continued)

Table 2. (*Continued.*)

Variable	General	Beef consumers	Lamb consumers
Fat	3.46	3.39	3.47
Type of meat	3.46	3.34	3.47
Nutritional value	3.43	3.39	3.42
Price	3.43	3.42	3.42
Ease of cooking	3.00	2.97	2.99
Shelf life	3.00	2.95	2.99
Organic	2.67	2.68	2.65
Attitudes (average)			
Attitude 1	3.99	4.01	3.98
Attitude 2	4.05	4.06	4.05
Attitude 3	3.94	3.96	3.92
Attitude 4	4.16	4.17	4.15
Attitude 5	4.20	4.21	4.21
Attitude 6	4.29	4.28	4.29

results in a higher likelihood of purchasing organic food products (Zepeda and Deal, 2009).

Although some authors consider that the supply of information has limited efficiency to change attitudes but does not affect intention or behavior (Balmford *et al.*, 2017; De Groeve and Bleys, 2017; Weingarten *et al.*, 2022), several studies highlight that the level of knowledge contributes towards positive attitudes and decisions to buy products grown organically (De Magistris and Gracia, 2008; Briz and Ward, 2009; Pieniak *et al.*, 2010; Aertsens *et al.*, 2011; Nguyen *et al.*, 2019), and even towards undertaking another type of diet (De Groeve and Bleys, 2017; Kemper, 2020; Grummon *et al.*, 2021).

Demographics

Alphabet theory states that demographics could influence consumer behavior indirectly through attitudes. Literature on the influence of demographics on sustainable attitudes and consumption are quite contradictory.

Some studies have found that younger people are more likely to develop pro-environmental behaviors (Zepeda and Li, 2007; Stoll-Kleemann and Schmidt, 2017; Kemper, 2020; Grummon *et al.*, 2021; Verain *et al.*, 2022). However, other studies revealed that older people are more devoted to making environmentally friendly purchases (Samdahl and Robertson, 1989; Vining and Ebreo, 1990; Gilg *et al.*, 2005; Zakowska-Biemans, 2011; Ghvanidze *et al.*, 2016; Wiernik *et al.*, 2016; Pfeiler and Egloff, 2018) compared to younger individuals.

Regarding the level of education, many studies have found a positive connection to pro-environmental behaviors (Gilg *et al.*, 2005; Zepeda and Li, 2007; Zakowska-Biemans, 2011; Ghvanidze *et al.*, 2016; Stoll-Kleemann and Schmidt, 2017; Pfeiler and Egloff, 2018; Grummon *et al.*, 2021). On other occasions, the results have not been conclusive (Samdahl and Robertson, 1989; Verain *et al.*, 2022).

The connection between environmental behavior and the level of income has also been reported in numerous studies. Some found a positive connection (Gilg *et al.*, 2005; Stoll-Kleemann and Schmidt, 2017; Grummon *et al.*, 2021), others a negative

connection (Samdahl and Robertson, 1989), and some found no connection at all (Vining and Ebreo, 1990; Zepeda and Li, 2007; Zakowska-Biemans, 2011; Ghvanidze *et al.*, 2016).

There seems to be greater consensus regarding gender, as most authors found that women take part in voluntary environmental protection activities more often and seem more interested in healthy and natural food than men (Conner *et al.*, 2008a; Tobler *et al.*, 2011; De Groeve and Bleys, 2017; Pfeiler and Egloff, 2018; Lanfranchi and Giannetto, 2021; Verain *et al.*, 2022).

Regarding the type of habitat and its relationship with consumers' environmental behavior, several studies have focused on developing consumption models of consumer behavior in rural areas (Michaelidou and Hassan, 2010; Wang *et al.*, 2014) and others have targeted on urban consumers (Cleveland *et al.*, 2005; Asteria *et al.*, 2014; Taufique and Vaithianathan, 2018). Some studies have found different environmental behaviors between rural and urban populations (Dean and Sharkey, 2011; Qian *et al.*, 2022; Waldman *et al.*, 2023), while in other works these differences have not been found (Schultz, 2016).

Based on prior studies, in our investigation we considered that gender, age, level of education, level of income and type of habitat could influence attitudes towards meat from transhumance livestock. However, and given the contradictory prior results regarding socio-demographic variables, our hypothesis will not specify the direction of these influences.

Hypothesis definition

According to the alphabet theory, attitudes are influenced by level of knowledge, demographics and context, and context also influences habits. These connections are formulated through the following hypotheses:

H1: The level of knowledge on transhumance positively influences consumer attitudes toward purchasing transhumance meat.

H2: Gender, age, level of education, income and type of habitat influence attitudes towards meat from transhumance livestock.

H3: Context positively influences attitudes toward the intention to purchase transhumance meat.

H4: Context positively influences habits toward the intention to purchase transhumance meat.

Lastly, attitudes positively influence habits, and the latter positively influence the intention to purchase meat from transhumance livestock, so:

H5: Attitudes positively influence habits in meat purchasing decisions.

H6: Habits positively influence the intention to purchase meat from transhumance livestock.

Materials and methods

Data were collected online via Google Forms using a convenience sample of Spanish grocery purchasers aged 18 and over in January 2021. Sampling followed a snowball technique by means of social media platforms. A screening question was included to identify meat-eating respondents. Convenience sampling suffers from selection bias, like other non-probabilistic sampling techniques. Still, it is a widely used technique in social research and can yield results comparable to their probability-sampled counterparts (Winton and Sabol, 2022). The questionnaire was approved by the ethics committee of the University Miguel Hernández (Spain) and the study was conducted in accordance with the Declaration of Helsinki, taking specific care to protect personal information according to European General Data Protection Regulation No. 2016/679. Respondents received an explanation of the objective of the study, emphasizing that the information requested would be exclusively used for research and that confidentiality is absolutely guaranteed. Respondents were informed that their participation was voluntary.

The sample consisted of 383 respondents, 244 of whom consumed both types of meat, 122 only consumed beef and 17 only consumed lamb. Thus, for the beef model, there is a total sample of 366 consumers and for the lamb model, 261 consumers. In both cases, we met the sample size proposed by Hair et al. (2010) for this type of studies, which is 200 subjects. Our work is comparable to others in which structural equation modeling (SEM) is used to develop models of sustainable purchasing behavior (Manala and Aure, 2019; Alam et al., 2020; Cao et al., 2021; Betzler et al., 2022).

Table 1 shows the definition of the variables in the survey. The attitudes towards meat from transhumance were measured through a 5-point Likert scale that allow to know the level of agreement towards 6 statements that indicate beliefs about a hypothetical quality certification of transhumance meat and were based on the studies by Adams and Adams (2011), Feldmann and Hamm (2015) and Gracia et al. (2011). All these variables were included as individual items in the model.

The subjective knowledge on transhumance was measured by adapting the scale of Flynn and Goldsmith (1999) that includes 4 statements measured in a 5-point Likert scale. Since it is an additive scale, the level of subjective knowledge was calculated by adding the scores of the 4 statements and the resultant variable ranges from a minimum value of 4 to a maximum value of 20. This additive variable was the one used in the model.

The context variables were also measured in a 5-point Likert scale (Table 1). The variables included in this scale were selected

according to the theoretical framework developed in Section 'Definition of variables'.

With respect to purchasing habits, we asked about the usual place of purchase of meat, the meat consumption frequency and food purchasing responsibility. We also consider being frequent organic and/or designation of origin meat purchasers. The socio-demographic variables considered were gender, age, level of education, level of family income and type of habitat. All these variables are categorical. The measurement of these variables is reported in Table 1.

Lastly, the dependent variable is the intention to purchase transhumance meat, which was measured on a 10-point scale from 1 (I would certainly not buy it) to 10 (I would certainly buy it).

We applied an SEM technique to test the suggested model and hypothesis. SEM techniques make it possible to form econometric structural equation models that explicitly incorporate the psychometric notion of unobservable variables (constructs) and measurement error (Fornell and Larcker, 1981). Since SEM often assumes linear relationships, it is similar to common statistical

Table 3. Factor loadings and Cronbach's α of latent variables of the model and knowledge level

Variables		Beef		Lamb	
		α	Factor loading	α	Factor loading
ATTITUDES		0.913		0.908	
	Attitude 2		0.891		0.867
	Attitude 4		0.864		0.849
	Attitude 5		0.839		0.846
	Attitude 3		0.814		0.807
	Attitude 6		0.809		0.830
	Attitude 1		0.799		0.774
CONTEXT		0.776		0.761	
	Fat		0.746		0.746
	Type of meat		0.693		0.734
	Appearance		0.669		0.642
	Taste		0.649		0.639
	Nutritional value		0.598		0.642
	Organic		0.572		0.553
	Shelf life		0.520		0.477
	Easy to prepare		0.511		0.445
	Price		0.429		0.389
HABITS		0.723		0.786	
	Purchase DO meat		0.789		0.825
	Purchase organic		0.727		0.773
	Purchase place		0.476		0.448
	Responsible for purchasing		0.299		0.236
Knowledge level about transhumance		0.879		0.888	

techniques such as analysis of variance, multivariate analysis of variance and multiple regression; yet, where SEM departs from the aforementioned is in its capacity to estimate and test complex patterns of relationships at the construct level (Morrison *et al.*, 2017). The basis of SEM techniques lies in the comparison of the variances and covariances matrix of the model specified by the researcher with the variances and covariances matrix of the sample. The more similar these two matrices are, the better the specified model is, since this means that the model reproduces the system of relationships existing in reality. Modeling follows a series of steps (Hair *et al.*, 2010) and in our case we start from a model based on the consumer behavior theory. This type of methodology is widely used in consumer behavior research, especially those that develop behavioral theory models (Muralidharan *et al.*, 2016; Scalco *et al.*, 2017; Stranieri *et al.*, 2023).

We have followed the two-stage procedure proposed by Anderson and Gerbing (1988) that consists of verifying first the measurement model and then the structural model.

The absolute fit measures determine the degree to which the overall model predicts the observed covariance or correlation matrix (Hair *et al.*, 2010). We reported the CMIN/DF, which, according to McIver and Carmines (1981), should be between 2 and 1 or 3 and 1, which are indicative of an acceptable fit between the hypothetical model and the sample data. In addition, the root mean square error of approximation (RMSEA) is reported. It is generally agreed that values below 0.05 indicate a close fit, while values of up to 0.08 are also acceptable (Browne and Cudeck, 1993). Lastly, the comparative fit index (CFI) and the Tucker–Lewis index (TLI) are also reported. It is generally agreed that values above 0.9 indicate a good fit. The model was estimated using Amos software; we operated the SEM by applying the maximum-likelihood estimator with a robust standard errors routine.

Results

Table 2 shows the sample description. The final sample of respondents was made of 44.9% of male respondents and 54.0% female respondents; 18.2% of the respondents were aged between 18 and 24 yr, 25.5% between 25 and 34, 22.6% between 35 and 49, 30.4% were 50 or over. In relation to the level of monthly income, the 4.4% of respondents declared to have a monthly income lower than €1000, 24.7% between €1000 and €1999, 29.6% between €2000 and €3499, 19.0% between €3500 and €4999 and 7.0% declared more than €5000. For what concerns the level of education: 0.8% of the respondents had completed only primary education, 11.7% had a high school diploma; 14.8% were university students and 69.6% had a university degree. According to the type of habitat, the sample is made up of 16.9% rural consumers and 83.1% urban consumers. With respect to the purchase habits, the 77.7% of the sample were the person responsible for purchasing at home and 49.0% buy meat in supermarkets. A 35.1% of the respondents purchase Protected Designation of Origin (PDO) meat and a 17.9% organic meat. The level of knowledge about transhumance is medium (10.67/20). With respect to contextual factors, taste (4.34/5) and appearance (4.21/5) are the most important attributes, with the organic production being the least important (2.67/5). In general, all the attitudes towards transhumant meat have a mean close to or above 4/5. When
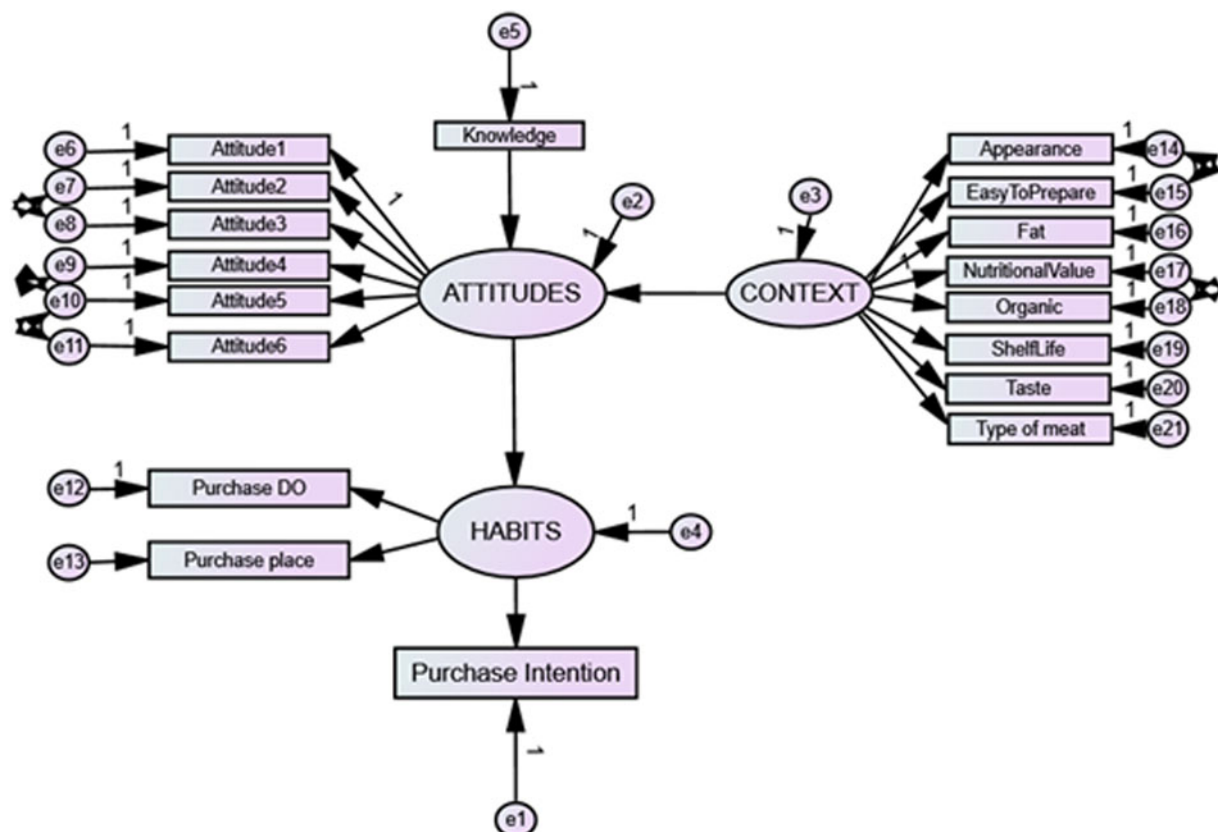

Fig. 2. Model for the intention to purchase beef from transhumance livestock.

the sample of beef consumers and lamb consumers is considered separately, the descriptions are very similar.

To proceed with the modeling, first, we perform a confirmatory factor analysis to verify the measurement quality of all latent constructs (attitudes, context and habits). Table 3 reports the standardized factor loadings of the single items for each unobserved variable, as well as the factor's Cronbach's α for the three constructs and for the knowledge level. Normally, factor loading over 0.70 is recommended, but researchers frequently obtain weaker outer loadings (<0.70) in social science studies (Vinzi et al., 2010). We decide to keep items with factor loadings over 0.40 for the structural model, that means that all the items except 'responsible for purchasing' were included. All constructs show a Cronbach's α above 0.70 that is indicated as a threshold to consider internal consistency as satisfactory (Nunnally and Bernstein, 1994).

Figure 2 shows the structural model to explain the intention to purchase beef from transhumance livestock and Table 4 shows the

Table 4. Estimates of the model for the intention to purchase beef from transhumance livestock

Variable	Estimate	S.E.	C.R.	P label
Effect on attitudes				
Context	0.632	0.091	6.942	***
Knowledge level	0.027	0.008	3.252	***
Effect on habits				
Attitudes	0.19	0.059	3.23	***
Effects on intention to purchase				
Habits	4.643	1.527	3.041	***
Effects on attitudes				
Attitude 2	1.086	0.069	15.786	***
Attitude 1	1.069	0.079	13.513	***
Attitude 4	1.008	0.066	15.193	***
Attitude 6	1.000			
Attitude 3	0.971	0.071	13.747	***
Attitude 5	0.928	0.052	18.003	***
Effects on habits				
Purchase DO	1.000			
Purchase place	0.546	0.228	2.397	**
Effects on context				
Fat	1.304	0.149	8.761	***
Type of meat	1.1	0.14	7.847	***
Nutritional value	1.000			
Organic	0.955	0.128	7.467	***
Appearance	0.801	0.107	7.498	***
Taste	0.707	0.096	7.353	***
Shelf life	0.675	0.118	5.707	***
Easy to prepare	0.623	0.12	5.196	***

Estimates refer to the unstandardized solution.
Significance levels: ***$P < 0.01$; **$0.01 \leqslant P < 0.05$.
$\chi^2 = 209.028$; $P < 0.001$; PCMIN/DF = 1.672; CFI = 0.967; TLI = 0.959; RMSEA = 0.043.

estimates of the structural equation model. The fit indicators of the model indicate a good fit.

According to the alphabet theory, three variables impact attitudes: demographic variables, context and level of knowledge. In our model, none of the demographic variables considered had an impact on attitudes. However, the context and level of knowledge did, with the contextual variables having the greatest influence on attitudes (0.632***). All the items that measure attitudes towards meat from transhumance livestock have a significant effect >0.9 (Table 4). Regarding the 'context', the variables that have a greater influence are fat content, type of meat, nutritional value and organic label. The price variable was finally excluded from the model because it was not significant. Regarding habits, only two of the initially proposed variables were significant: purchasing meat with a designation of origin and the place of purchase. On the one hand, those who buy meat with a designation of origin have a higher intention to purchase beef from transhumance livestock. Meanwhile, the positive sign of purchase place indicates that people who buy meat in butchers or specialty retailers have a higher purchase intention out of habit.

The R^2 related to purchasing intention in the structural equation model is 0.260. According to the literature which dealt with R^2 values for the endogenous constructs, they range from a low of 12% to a high of 64% (Joo and Sohn, 2008). The judgment of what R^2 level is high or weak depends on the specific research discipline and according to Hair et al. (2011), R^2 results of 0.20 are considered high in disciplines such as consumer behavior. So, habits have a positive and significant effect on purchase intention, suggesting that those consumers who are familiar with the food and meat shopping would be more prone to buy transhumance meat.

Figure 3 shows the model for the intention to purchase lamb from transhumance livestock and Table 5 shows the estimates of the structural equation model. The fit indicators of the model indicate a good fit. The model is very similar to the one for beef, with the slight difference that, in this case, besides price, neither easy to prepare nor shelf life have been found to be significant as contextual variables.

As with the prior model, none of the demographic variables considered has a significant effect on attitudes. Those that do are the context (0.56***) and the level of knowledge (0.047***), with the former having a greater impact.

All the indicators that measure attitudes towards meat from transhumance livestock have a significant and positive effect (Table 5). As with beef, the variables that best explain the context are fat content, type of meat, nutritional value and organic label. Regarding the habits, the same two observable variables were significant: purchasing meat with designation of origin and purchase place, so the same reading can be inferred.

The R^2 related to purchasing intention in the structural equation model is 0.36, that is, the predictors of intention to purchase explain 36.1% of its variance. As was the case in the lamb model, this value may be considered low in some disciplines, but it is valid in consumer research.

Discussion

In our model, the *level of knowledge* was significant in shaping attitudes towards this type of livestock farming, which confirms our first hypothesis. However, the effect is low and our sample has intermediate knowledge of transhumance. Clark et al. (2019) show that, in general, consumers have a low level of
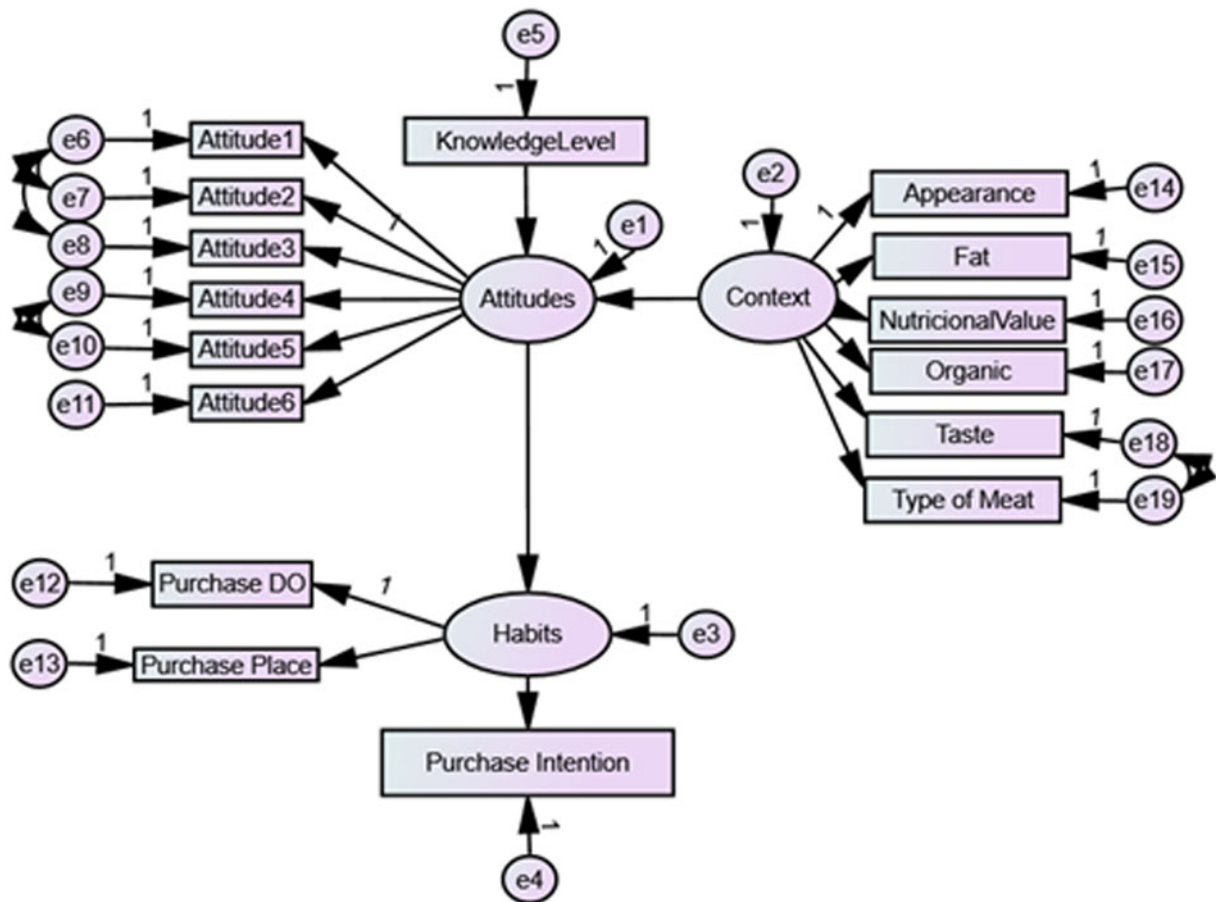
Fig. 3. Model for the intention to purchase lamb from transhumance livestock.

knowledge of animal production systems. Therefore, and in line with Stampa *et al.* (2020), we consider that greater awareness and knowledge of the impact of conventional and alternative methods of meat production on the environment and animal welfare proved to positively affect consumer attitudes and encourage the purchase of meat from transhumance livestock. As García-Gudiño *et al.* (2021) say, knowledge must be increased to assign a greater value to the product and understand the higher price that these types of products may reach in markets.

Our study did not show any connection between *demographics* and attitudes. As we anticipated, the impact of demographic variables on explaining sustainable purchasing behavior is contradictory. In the review by Schäufele and Hamm (2017), they found that some of the research papers did not find a significant connection between demographics and behavioral intentions, or could not find a correlation at least for age, education and income. Our second hypothesis is therefore rejected, as age, level of income, gender, level of education and type of habitat do not shape attitudes towards transhumance livestock farming.

Regarding the *context*, we can confirm the third hypothesis, as it has a strong impact on attitudes in both models. In both cases, the order of contribution of the indicators that comprise this construct is similar. The fat content is undoubtedly the most important aspect, even over taste or appearance. Realini *et al.* (2014) also found that the fat content is the most important purchase feature in beef, ahead of others such as price, color or origin. However, our result differs from that obtained by Bernués *et al.* (2012), who found

that fat content has a significant importance for lamb consumers, but lower than the appearance of freshness. Finally, we measured the importance of the fat attribute, but not the preference for higher or lower fat contents in meat whose results vary in different countries (Zenoli *et al.*, 2013; Cubero Dudinskaya *et al.*, 2021).

Then there is the price, which was not significant in either of the two models. This factor, which was relevant for some authors (Merlino *et al.*, 2017; Ellies-Oury *et al.*, 2019; Nguyen *et al.*, 2019; Lanfranchi and Giannetto, 2021), was not important in our study. In this sense, our results coincide with those obtained by Conner *et al.* (2008*a*), who concluded that less than half of respondents said that price is a barrier to an increased purchase of pasture-raised products. Furthermore, Mandolesi *et al.* (2020) also found it to be a secondary attribute for lamb and goat meat consumers, behind others including freshness, origin, production system and rearing conditions.

Hypothesis 4 has been rejected as the context does not impact habits in none of the models.

Attitudes have a positive and significant effect on habits, confirming H5. Regarding how these attitudes are shaped, all the items have a similar and significant influence. In the study by Bernués *et al.* (2003), the origin is one of the key pieces of information that European consumers of lamb and beef meat most call to be on the product's label. In their research, they also obtained a similar result to ours regarding quality-related information only being relevant for beef consumers. Concern over a quality label for beef was also revealed in the study by

Table 5. Estimates of the model o for the intention to purchase lamb from transhumance livestock

Variable	Estimate	S.E.	C.R.	P label
Effect on attitudes				
Context	0.56	0.095	5.921	***
Knowledge level	0.047	0.013	3.659	***
Effect on habits				
Attitudes	0.141	0.059	2.409	**
Effects on intention to purchase				
Habits	6.493	2.712	2.394	**
Effects on attitudes				
Attitude 6	1.098	0.072	15.345	***
Attitude 2	1.071	0.093	11.475	***
Attitude 5	1.00			
Attitude 4	1.045	0.071	14.794	***
Attitude 1	1.051	0.096	10.99	***
Attitude 3	0.980	0.094	10.455	***
Effects on habits				
Purchase DO meat	1.00			
Purchase place	1.002	0.42	2.385	**
Effects on context				
Fat	1.346	0.157	8.592	***
Type of meat	1.306	0.154	8.486	***
Nutritional value	1.000			
Organic	0.878	0.136	6.44	***
Appearance	0.603	0.102	5.934	***
Taste	0.512	0.09	5.676	***

Estimates refer to the unstandardized solution.
Significance levels: ***$P < 0.01$; **$0.01 \leqslant P < 0.05$.
$\chi^2 = 159.436$; $P < 0.001$; PCMIN/DF = 1.661; CFI = 0.963; TLI = 0.954; RMSEA = 0.050.

Ellies-Oury et al. (2019). In a study on lamb and goat meat consumption by Mandolesi et al. (2020), the authors show the importance that the origin has for consumers, and its clear connection to the quality of the product. Pohjolainen et al. (2016) also detect the importance of information on the origin for meat consumers.

Regarding the *habits*, in both models, being a purchaser of meat with a designation of origin has a significant influence on the purchase intention through these habits, which is why a quality certificate could help insert these products in the market. Although the importance of designations of origin in the purchase of meat has been highlighted in several studies (Gracia et al., 2011; Bernabéu et al., 2018; Cubero Dudinskaya et al., 2021), in others this importance was more limited (Angón et al., 2022). Meanwhile, in our results, being a purchaser of organic meat was not significant. This may be due to only 17.9% of the sample claiming to buy organic meat and to its low availability in Spain. Many studies (Zepeda and Deal, 2009; Hjelmar, 2011; Janssen, 2018) view the latter as an obstacle for the consumption of organic products.

In both models, the place of purchase is a habit positively connected to the intention to purchase meat from transhumance livestock. Our results are in line with the study by Conner et al. (2008b) that reports that consumers overwhelmingly prefer to obtain the information about pasture-raised meat at the point of purchase.

In any case, H6 is confirmed, as habits explain a significant part of the intention to purchase meat from transhumance livestock. This makes us believe that a certificate that guarantees the product's origin would help insert these products in the market and reach consumers through specialty retailers.

Conclusions

Meat of transhumant origin is a better option for consumers who seek more sustainable alternatives within meat consumption, as well as to ensure the survival of a livestock farming activity that is part of European cultural heritage. Learning the aspects of consumer behavior that can contribute to the intention to purchase this type of meat is essential. As the literature on the meat consumer makes clear, the profile and consumption patterns for beef and lamb are different, so it is essential to investigate separately the factors that influence the purchase intention for both types of meat.

According to our study, the alphabet theory is a suitable conceptual framework for explaining the purchasing behavior of lamb and beef from transhumance livestock through meat purchasing habits and the attitudes towards a transhumance certificate. Our study is also one of the first to empirically verify this theory.

Promoting knowledge on this practice could have a positive impact on the intention to purchase it. Messages should emphasize the quality and safety of this type of livestock farming, as well as its ties to the local community. Despite all this, factors linked to habits have great importance in the purchasing decision. Especially in the case of beef, where the person responsible for making the purchase may have enough knowledge of the product to make the right purchasing choice. In the purchase of lamb, the role of specialty retailers becomes even more important.

Limitations and future research

This study is exploratory and, as such, the results have to be interpreted. Furthermore, we used convenience sampling. This means that future studies should use probability sampling to extrapolate the results to the population. This study has not taken availability into account as a key contextual factor when purchasing food products. The effect of availability on consumer behavior regarding pasture-raised products has been assessed in few studies. It was reported to be difficult to measure because consumers thought they already consumed these products, whereas the real availability of these products in the stores was too low to make such statements feasible. However, it would be interesting to find a way to measure it, and to search for information on these products to convey the initial proposal of the alphabet theory in the best way possible.

As future lines of research, it would be interesting to analyze the importance that a transhumant livestock label could have on the choice to purchase meat products. This label would make it possible to differentiate this traditional livestock farming activity from others that are less sustainable and less rooted in rural areas.

Conflict of interest. The authors declare none.

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