

Beef consumers' perception of welfare on animal farm slaughter in Altamira, Pará, Brazil

Percepción de los consumidores de carne de vacuno sobre el bienestar en el sacrificio de animales de granja en Altamira, Pará, Brasil



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ABSTRACT: The aim of this study was to identify the level of knowledge of consumers of animal products of welfare on animal farm slaughter in Altamira, Pará, Brazil. The survey was conducted by means 382 questionnaires, containing ten open and closed questions, with a "yes" or "no" answers, taking into account gender, age group, schooling, and family income. With regard to the profile of the interviewees, 53,9 % were women and 46,1 % men. Most of the participants were aged between 18 and 30 (36,1 %), had completed elementary school (30,1 %) and had a family income of between one and three minimum wages (44,8 %). The majority of consumers (86,1 %) answered "yes" to the first question, which meant that animal protein was a component of their daily diet. It can be concluded that the majority of consumers of sourced protein said they had no knowledge on the subject and did not know how animals were slaughtered, but they recognized that those products were part of their daily diet, besides paying more for products with a quality seal.

Key words: Animal welfare, ruminants, animal protein, management practices.

RESUMEN: El objetivo de este estudio fue identificar el nivel de conocimiento de los consumidores de productos de origen animal sobre el bienestar de los animales de granja en Altamira, Pará, Brasil. La encuesta se realizó mediante 382 cuestionarios, que contenían diez preguntas, abiertas y cerradas, con respuesta «sí» o «no», teniendo en cuenta el sexo, el grupo de edad, la escolaridad y la renta familiar. En cuanto al perfil de los entrevistados, el 53,9% eran mujeres y el 46,1% hombres. La mayoría de los participantes tenía entre 18 y 30 años (36,1%), había terminado la enseñanza primaria (30,1%) y tenía unos ingresos familiares de entre uno y tres salarios mínimos (44,8%). La mayoría de los consumidores (86,1%) respondió «sí» a la primera pregunta, lo que significa que la proteína animal es un componente de su dieta diaria. Se puede concluir que la mayoría de los consumidores de proteína de origen dice no tener conocimiento del tema y no sabe cómo se sacrifican los animales, pero reconoce que estos productos son parte de su dieta diaria, además de pagar más por productos con sello de calidad.

Palabras clave: Bienestar animal, rumiantes, proteína animal, prácticas de gestión.

INTRODUCTION

There is currently no consensus on the concept of animal welfare (AW). Over the years, this concept has undergone great variations, as it is also characterized by changes related to values and beliefs, as well as the understanding of science about animals and their particularities. This definition becomes increasingly necessary due to the animals' ability to feel pain, pleasure and present moments of "affection" or not, such as during handling (1, 2).

In this sense, AW is of great importance for the international meat trade, due to the use of AW seal on

products, besides the federal inspection (SIF) and sustainable production seals. Currently, there is a growing concern regarding AW and sustainable meat production among exporting countries and consumers, such as the world's largest beef exporters: China and the United States (3).

This care corresponds to breeding, handling, transport, and slaughter through the use of more humane practices and sustainable production systems guaranteeing AW (4). According to Ordinance No. 365 of July 16, 2021, humane slaughter is the set of technical and scientific guidelines capable of ensuring AW from reception to slaughter, which must be carried out humanely (5, 6).

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Products considered "animal-friendly", i.e. those produced according to AW guidelines, are considered to be of higher quality and healthier food when food safety is taken into account, leading more and more consumers, both in the domestic and foreign markets, to prefer to purchase welfare-friendly products (7).

As the consumer recognizes animal suffering as a relevant factor, an economic value of AW can be inferred (8, 9). Products from systems with a high AW index have added economic and ethical values that satisfy the demand of a specific market niche. (10, 11).

Consumers can be grouped in two ways: end consumers who seek high quality, basically formed by consumers of natural, organic products, meats of good origin inspected after slaughter, and with a high level of AW. This consequently adds a higher value to the meat, and regular consumers, who seek to buy meat with a lower economic value. These would be more sensitive to higher prices (12).

It is evident the need for greater dissemination about AW in animal production systems, since there is a large part of the population that is still not concerned about this issue, such as, for example, the consumers of Santarém, West of Pará (13). Although animal protein is part of their diet, they have no knowledge about AW, although there is a greater concern in relation to transport and especially around slaughter, to ensure it is carried out in a humanized way (14, 15, 16).

This study is related to animal health, since it addresses consumer perception of welfare associated with slaughter. Animal welfare correlates the physical and mental health of animals, associated with handling, transport and slaughter, which can trigger injuries, stress and even diseases that compromise their health, impacting on the quality of food of animal origin. Assessing consumers' knowledge of their willingness to pay for welfare-certified products highlights the importance of developing more humane practices to promote animal welfare and health, encouraging more sustainable trade. In Altamira, Pará, so far, there are no results regarding the perspective of

consumers in relation to AW and to what extent this issue is relevant in the choice of meat products. Thus, this research aims to identify the level of knowledge of beef consumers about welfare in the slaughter of farm animals in Altamira, Pará State, Brazil.

MATERIAL AND METHODS

Local

The survey took place in the municipality of Altamira, Pará (latitude -3.20407 and longitude -52.21). Altamira is a municipality in northern Brazil, with a territorial area of 159,533.306 km², being considered the largest municipality in the Brazilian territory. Brazilian livestock is responsible for a significant amount of meat production in the country. More than 150 countries benefit from the export of quality meat, with a 4-fold increase in beef production over the last 40 years. The Brazilian herd reached 238.6 million head in 2023, which is considered to be the largest recorded in 50 years. The state of Pará in the north of the country has more than 25 million head (17).

Variables

A total of 382 questionnaires, containing ten objective questions, with "yes" or "no" answer alternatives, were applied. The following variables were also considered: gender; age group (between 18 and 30 years, 30 and 40 years, 40 and 50 years, 50 and 60 years, and over 60 years); education (IES = Incomplete Elementary School; CES = Complete Elementary School; IHS = Incomplete High School; CHS = Complete High School; IHE = Incomplete Higher Education; CHE = Complete Higher Education); and family income (between 1 and 3 minimum wages (MW), 3 and 6 MW, 6 and 9 MW, 9 and 12 MW, and more than 12 MW) of the participants. The questions related to the questionnaire are shown in Table 1.

Table 1. Questions applied in the questionnaire in relation to the welfare of farm animals, in Altamira, Pará State, Brazil. / Preguntas aplicadas en el cuestionario en relación al bienestar de los animales de granja, en Altamira, Estado de Pará, Brasil.

Number	Questions
1	Are animal products, such as beef, part of your daily diet?
2	Do you believe you have enough knowledge about how the animals that eat the products you consume are raised?
3	Do you care to know what methods are used to raise or slaughter animals?
4	Have you ever heard of animal welfare?
5	Do you believe that animals raised according to welfare standards will result in higher quality products?
6	Would you pay more for a product to be assured that the animals have been raised under welfare conditions?
7	Do you believe that farm animals are subjected to any kind of suffering during their breeding?
8	Do you know about the existence of laws guaranteeing the welfare of animals?
9	Would you start to choose products certified (seals) by animal welfare control agencies?
10	Would you like that supermarket chains should offer products obtained in accordance with animal welfare standards?

Sample size and statistical analysis

The sample was calculated based on a population of approximately 126.279 people from Altamira, Pará State, Brazil. The formula used for calculating the population was:

$$n = N \cdot Z^2 \cdot p \cdot (1 - p) / Z^2 \cdot p \cdot (1 - p) + e^2 \cdot N - 1$$

Where *n* represents the calculated sample; *N*, the population; *Z*, the normal variable; *p*, the real probability of the event; and *e*, the sampling error.

Based on this calculation, 96 questionnaires would have to be applied; however, 382 questionnaires were answered, with a sampling error of 5 %. Data collection was structured in an Excel® spreadsheet and relative and absolute data were calculated using descriptive statistics.

Questions were grouped into pairs 1 and 2, 3 and 4, 5 and 6, 7 and 8, 9 and 10; and then SAS program was used. The contingency matrix used had two rows and two columns (2x2), with a degree of freedom equal to 1. A 5 % significance level was used.

RESULTS AND DISCUSSION

Regarding the profile of the interviewees, 53,9 % were women and 46,1 % were men. Most of the participants were between 18 and 30 years old (36,1 %), had completed elementary school (30,1 %) and had a family income of one to three minimum wages (44,8 %) (Table 2).

The majority of consumers (86,1 %) answered “yes” to the first question, which means that animal protein from beef is a component of their daily diet (Figure 1). Corroborating this study, Silva *et al.* (14), in a study applied in Santarém, western region of Pará, showed that most consumers (92,7 %) use beef as animal protein in their diet and that most respondents (61,9 %) have no knowledge about AW practices in breeding systems, which reinforces the importance of developing strategies to inform about AW on farms.

Regarding question two (63,6 %), participants reported not having enough knowledge about the product they consume, besides not knowing how to handle the animals. These results are similar to those found in the study by Silva *et al.* (14), who identified that 60 % of respondents have no

Table 2. Percentage response rate of respondents according to gender, age, education, and perceived family income. / *Porcentaje de respuesta de los encuestados según sexo, edad, educación e ingresos familiares percibidos.*

Description		
Sex	Men	46,1%
	Women	53,9%
Total		100%
Age	18 to 30 years old	36,1%
	31 to 40 years old	35,3%
	41 to 50 years old	13,4%
	51 to 60 years old	14,4%
	Over 60	0,8%
	Total	
Schooling	IES	17,8%
	CES	30,1%
	IHS	14,4%
	CHS	7,9%
	IHE	15,2%
	CHE	14,6%
Total		100%
Family Income	1 - 3 wage	44,8%
	3 - 6 wage	39,5%
	6 - 9 wage	3,1%
	9 - 12 wage	9,5%
	Above 12 wage	3,1%
Total		100%

Note: IES = Incomplete Elementary School; CES = Complete Elementary School; IHS = Incomplete High School; CHS = Complete High School; IHE = Incomplete Higher Education; CHE = Complete Higher Education.

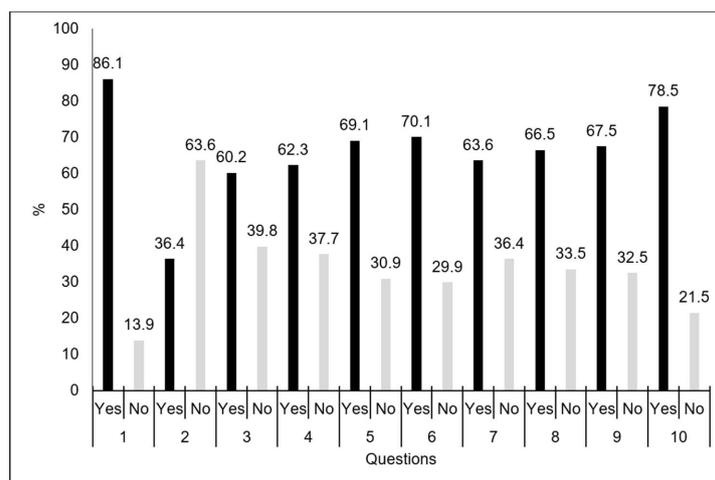


Figure 1. Percentage of responses per question. 1. Are animal products, such as beef, part of your daily diet?; 2. Do you believe you have enough knowledge about how the animals that eat the products you consume are raised?; 3. Do you care to know what methods are used to raise or slaughter animals?; 4. Have you ever heard of animal welfare?; 5. Do you believe that animals raised according to welfare standards will result in higher quality products?; 6. Would you pay more for a product to be assured that the animals have been raised under welfare conditions?; 7. Do you believe that farm animals are subjected to any kind of suffering during their breeding?; 8. Do you know about the existence of laws guaranteeing the welfare of animals?; 9. Would you start to choose products certified (seals) by animal welfare control agencies?; 10. Would you like that supermarket chains should offer products obtained in accordance with animal welfare standards? / *Porcentaje de respuestas por pregunta. 1. ¿Forman parte de su dieta diaria los productos de origen animal, como la carne de vacuno?; 2. ¿Cree que tiene suficientes conocimientos sobre cómo se crían los animales que consumen los productos que usted consume?; 3. ¿Le interesa saber qué métodos se utilizan para criar o sacrificar animales?; 4. ¿Ha oído hablar alguna vez del bienestar animal?; 5. ¿Cree que los animales criados según normas de bienestar darán lugar a productos de mayor calidad?; 6. ¿Pagaría usted más por un producto para tener la seguridad de que los animales han sido criados en condiciones de bienestar?; 7. ¿Cree que los animales de granja son sometidos a algún tipo de sufrimiento durante su cría?; 8. ¿Conoce la existencia de leyes que garanticen el bienestar de los animales?; 9. ¿Empezaría a elegir productos certificados (sellos) por organismos de control del bienestar animal?; 10. ¿Le gustaría que las cadenas de supermercados ofrecieran productos obtenidos de acuerdo con las normas de bienestar animal?.*

knowledge about how animals are raised, representing a lack of knowledge on the part of the population about production systems and practices that promote AW (5).

Regarding concern about the methods adopted in animal breeding or slaughtering, 60,2 % of the participants stated that they were concerned about the methods adopted for these purposes. In addition, 62,3 % responded that they had heard of AW issue. One study showed that 90 % of respondents were concerned about the way animals are raised and slaughtered, and 87,8 % considered important to know more about the breeding system before purchasing the product (18).

Regarding the raising of animals under AW standards (69,1 %), they believe that they originate better quality products, which are more appreciated by the population. In Latin America, consumers have been concerned about AW parameters and rearing systems, considering it as a guarantee of good quality meat, as observed in the study by Miranda de la Lama *et al.* (19). It is evident that AW at all production stages results in better quality products from the carcass and later from the meat, due to the reduction of muscle glycogen consumption, lactate production by the muscles and pH balance, preventing undesirable characteristics, such as rigid texture and dark or pale color.

The majority of respondents (66,5 %) stated that they were aware of the laws supporting AW. Similar results were obtained by Faucitano *et al.* (20) and Ingenbleek *et al.* (21) in Porto Alegre, Rio Grande do Sul, where there was a greater demand by consumers in relation to the acquisition of products from animals raised and slaughtered according to AW. They also presented greater knowledge on the subject, since this is one of the states that has a large number of animals destined for milk production, which justifies the concern with AW and its impacts on both the quality and the quality of production, also causing greater consumer demand in relation to the product offered.

The majority of consumers (70,1 %) stated that they were willing to pay a higher price for a product guaranteeing that the animals had been raised under AW conditions. Moraes *et al.* (18) stated that 90,1 % of respondents declared they would buy products with an animal welfare certification seal and, of these, 74,2 % would pay a little more for products that had a breeding certification within animal welfare standards, demonstrating concern of meat consumers in relation to welfare.

Regarding the fact that production animals are subjected to some type of suffering during rearing, the majority of respondents (63,6 %) believed that those animals suffered. Andrade *et al.* (22), found that 83,6 % of consumers believed that farm animals

experienced suffering during slaughter, evidencing the lack of knowledge of many consumers about the legislation that recommends humane practices during slaughter, promoting animal ethical and respectful handling.

In addition, 67,5 % of the interviewees reported that they could select products certified by AW control agencies, which would reinforce the interest in acquiring products through purchases in stores offering them in accordance with AW standards (78.5 %). Silva *et al.* (13) described that the preference for certified products tended to be more explicit in society, possibly due to education and knowledge of definitions linked to AW. Thus, lack of information is one of the main obstacles to the purchase of products qualified with the AW seal (23).

Questions 1, 4, 5 and 10 were influenced by the interviewee's age. Gender was determinant in answers 1 and 7, family income in questions 1, 5, and 7 and schooling in questions 2, 3 and 9 (Table 3). Thus, it is observed that socioeconomic factors were determinant in the answers given. Therefore, educational actions from childhood or the information transmitted are fundamental for the good development of population when it involves AW.

The study shows that consumers in Altamira, Pará, were unaware of the welfare of animals destined for slaughter. They also show that the public knowledge on this subject was low in several regions of Brazil, especially in less urbanized areas. Therefore, this study aimed to characterize the socioeconomic profile of animal protein consumers with respect to welfare.

The results show that, despite awareness of quality seals, there is still lack of knowledge about animal welfare and how it can influence consumer decisions, which reinforces the need for actions aimed at ensuring greater transparency in animal production. This study shows that actions combining education and economic incentives can influence more conscious consumption. In relation to the

willingness to pay more for these products, there is the possibility of changes in consumer behavior in relation to breeding and slaughtering practices. Future research could explore different informational approaches and their impact on consumer purchases, and research how these actions can be adapted to the sociocultural and economic issues of different regions, broadening the debate on animal welfare at the local and national level.

CONCLUSION

Consumers of animal protein in Altamira, Pará, stated they have no knowledge about AW and did not know how to raise the animals. However, they were willing to pay more for a product with the AW guarantee seal. In order to carry out activities that promote animal welfare, it is necessary that consumers in the municipality of Altamira, Pará, be informed through education campaigns aimed at the local population. These should provide information on animal welfare and impacts on both animals and trade and also on the quality of the products, as well as on the availability of visible seals on the packaging so that they can be identified by consumers. The development of partnerships among inspection and regulatory bodies, producers and traders can ensure quality and transparency throughout the process, reinforcing consumption through the choice of certified products.

REFERENCES

1. Reimert I, Webb LE, van Marwijk MA, Bolhuis JE. Towards an integrated concept of animal welfare. *Animal*. 2023; 1:008-38.
2. Martinez J, Von Nolting C. "Animal welfare"-A European concept. *Animal*. 2023; 17: 100839.
3. Dahal BR, DeLong KL, Gao S, Grebitus C. Consumers' beef purchasing behavior across countries. *Meat Science*. 2024; 217: 109611.

Table 3. Statistical data obtained from the chi-square test for the socioeconomic variables according to the questions asked. / *Datos estadísticos de la prueba chi-cuadrado para las variables socioeconómicas según las preguntas formuladas.*

Question	Age group	Sex	Family income	Schooling
1	0,010*	0,021*	0,002*	0,125
2	0,568	0,112	0,785	0,004*
3	0,895	0,524	0,458	0,014*
4	0,007*	0,985	0,652	0,124
5	0,014*	0,457	0,001*	0,892
6	0,125	0,114	0,016	0,952
7	0,859	0,012*	0,001*	0,256
8	0,145	0,154	0,145	0,245
9	0,124	0,056	0,652	0,008*
10	0,004*	0,485	0,256	0,958

Note: *Significant at 5 %.

4. Silva WCD, Silva JARD, Camargo-Júnior RNC, Silva ÉBRD, Santos MRPD, Viana RB, Silva AGME, Silva CMGD, Lourenço-Júnior JDB. Animal welfare and effects of per-female stress on male and cattle reproduction-A review. *Frontiers in Veterinary Science*. 2023; 10: 1083469.
5. Alonso ME, González-Montaña JR, Lomillos JM. Consumers' concerns and perceptions of farm animal welfare. *Animals*. 2020; 10(3): 385.
6. Pastorino LF, Almeida WCD. Impact of bilateral trade on the promotion of animal welfare rules. The case of trade relations between the European Union and Mercosur. *Animal*. 2023; 17: 100837.
7. Castelló-Martínez A. Animal welfare as a central theme of digital communication in the food sector: meat and dairy subsectors El bienestar animal como eje de la comunicación digital del sector alimentación: los subsectores cárnico y lácteo. *Doxa. Comunicación*. 2021; 33: 179-196.
8. Naspetti S, Mandolesi S, Buysse J, Latvala T, Nicholas P, Padel S, ... Zanoli R. Consumer perception of sustainable practices in dairy production. *Agricultural and Food Economics*. 2021; 9: 1-26.
9. Hocquette JF. Consumer perception of livestock production and meat consumption; an overview of the special issue "Perspectives on consumer attitudes to meat consumption". *Meat Science*. 2023; 200: 109163.
10. Silva WCD, Silva ÉBRD, Santos MRPD, Camargo-Junior RNC, Barbosa AVC, Silva JARD, Vinhote JA, Sousa EDVD, Lourenço-Júnior JDB. (2022). Behavior and thermal comfort of light and dark coat dairy cows in the Eastern Amazon. *Frontiers in Veterinary Science*. 2022; 9: 1006093.
11. Liu J, Chriki S, Kombolo M, Santinello M, Pflanzler SB, Hocquette É, ... Hocquette JF. Consumer perception of the challenges facing livestock production and meat consumption. *Meat Science*. 2023; 200: 109144.
12. Rodrigues LS, Silva JARD, Silva WCD, Silva ÉBRD, Belo TS, Sousa CEL, Rodrigues TCGDC, Silva AGME, Prates JAM, Lourenço-Júnior JDB. A Review of the Nutritional Aspects and Composition of the Meat, Liver and Fat of Buffaloes in the Amazon. *Animals*. 2024; 14(11): 1618.
13. Silva CADS, Joset WCL, Lourenço JB, Barbosa AVC, Silva WCD, Silva JARD. Animal protein consumer's perception on the welfare of production animals in Belém, Pará State, Brazil. *Acta Scientiarum. Animal Sciences*. 2021; 43: e53784.
14. Silva WCD, Silva JAR, Silva ÉBRD. Percepção do consumidor de proteína animal sobre o bem-estar dos animais de produção em Santarém, Pará, Brasil. *Revista CES Medicina Veterinária e Zootecnia*. 2020. 15(2): 74-64.
15. García-Gudiño J, Blanco-Penedo I, Gispert M, Brun A, Perea J, Font-i-Furnols M. Understanding consumers' perceptions towards Iberian pig production and animal welfare. *Meat Science*. 2021; 172: 108317.
16. Arno A, Silveira RMF, da Silva IJO. Characterization, typification and holistic consumer perception of welfare in laying poultry in Brazil: a machine learning approach. *The Journal of Agricultural Science*. 2023; 161(5): 743-753.
17. Instituto Brasileiro de Geografia e Estatística (IBGE) (2024). <https://www.ibge.gov.br/explica/producao-agropecuaria/bovinos/br>. Accessed on: 28.11.2024.
18. Moraes RE, Soares MF, Vaz RZ, Pereira GM, Mascarenhas MW, Moreira SM, Silveira IDB. Perfil de consumo da carne ovina frente ao bem-estar animal na visão de produtores e consumidores. *Research, Society and Development*. 2020; 9(10): e089108158-e089108158.
19. Miranda-de la Lama G, Este'vez-Moreno L, Sepu'lveda W, Estrada-Chavero M, Rayas-Amor A, Villarroel M, Maria GA. Mexican consumers' perceptions and attitudes towards farm animal welfare and willingness to pay for welfare friendly meat products. *Meat Science*. 2017; 125(152): 113-106.
20. Faucitano L, Martelli G, Nannoni E, Manteca X. Fundamentals of animal welfare in meat animals and consumer attitudes to animal welfare. In: *New aspects of meat quality*. Woodhead Publishing. 2022; 2: 703-667.
21. Ingenbleek PT, Krampe C. The end of animal welfare labelling as we know it? Persisting problems at the consumer level and PLF-based solutions. *Frontiers in Animal Science*. 2022; 3: 819893.
22. Andrade JPSC, Cecchin D, Pinto FO, Nepomuceno GL, Silva FC. Percepção dos consumidores sobre o bem-estar dos animais de produção em Niterói (RJ). *Energia na Agricultura*. 2019; 34(4): 510-501.
23. Blanc S, Massaglia S, Borra D, Mosso A, Merlino VM. Animal welfare and gender: a nexus in awareness and preference when choosing fresh beef meat?. *Italian Journal of Animal Science*. 2020; 19(1): 420-410.

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Authors' contribution: Welligton Conceição da Silva: **Conceptualization, Methodology, Software.** Éder Bruno Rebelo da Silva and Raimundo Nonato Colares Camargo-Júnior1: **Data curation, Writing - Preparation of original draft. original draft.** Carlos Eduardo Lima Sousa, Tatiane Silva Belo, Lucas Vieira Fontenele and Osvaldo Gato Nunes Neto: **Visualization, Research.** Jamile Andréa Rodrigues da Silva and José de Brito Lourenço-Júnior1: **Supervision.** Welligton Conceição da Silva: **Software, Validation, Writing - Proofreading and Editing.**

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