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ARTICLE

Impact of objective knowledge and self-assessed knowledge on the population's attitudes towards the Brazilian agribusiness

O impacto do conhecimento objetivo e do conhecimento autoavaliado nas atitudes da população frente ao agronegócio brasileiro

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Abstract: In Brazil, positive and negative information is spread about agribusiness. In this context of positive and negative information, the population forms its attitudes towards Brazilian agribusiness. Attitudes are related to objective knowledge, that is, accurate scientific information or consolidated data the individual has in his/her memory, and self-assessed knowledge, that is, what the individual thinks she or he knows. The objective was to identify the impacts of objective knowledge and self-assessed knowledge about Brazilian agribusiness on the population's attitudes. Data were collected through the application of questionnaire to a sample of 468 participants. Data were analyzed using descriptive statistics, and an ordinal logistic regression model. The results show that the greater the objective knowledge and the greater the self-assessed knowledge, the greater the probability of an individual having a more positive attitudes towards Brazilian agribusiness. The results also show that the further to the right on the political spectrum the individual declared himself/herself, the greater the probability of showing more positive attitudes towards the Brazilian agribusiness.

Keywords: family farming, attitudes, public understanding, political positioning, ordinal logistic regression.

Resumo: No Brasil, circulam informações positivas e negativas sobre o agronegócio. É nesse contexto que a população forma suas atitudes frente ao agronegócio brasileiro. As atitudes estão relacionadas ao conhecimento objetivo, ou seja, as informações científicas acuradas ou dados consolidados que o indivíduo tem em sua memória; e ao conhecimento autoavaliado, ou seja, aquilo que o indivíduo julga saber. O objetivo foi identificar o impacto do conhecimento objetivo e do conhecimento autoavaliado sobre o agronegócio brasileiro nas atitudes da população. Os dados foram coletados por meio da aplicação de questionário com uma amostra de 468 participantes e analisados utilizando estatística descritiva e um modelo de regressão ordinal. Os resultados demonstraram que quanto maior o conhecimento objetivo e quanto maior o conhecimento autoavaliado maior é a probabilidade de um indivíduo ter atitudes positivas frente ao agronegócio. Os resultados também demonstraram que indivíduos com posicionamento político mais a direita tem maior probabilidade de ter atitudes positivas frente ao agronegócio brasileiro.

Palavras-chave: agricultura familiar, atitudes, compreensão da população, posicionamento político, regressão logística ordinal.

1. Introduction

Brazil exports part of its agricultural and livestock production to over 150 countries. This makes agribusiness the basis of the Brazilian economy, in addition to contributing to global food security (Brasil, 2021). However, Brazilian agribusiness is also commonly associated with environmental and social problems, such as deforestation and conflicts in indigenous lands (Rajão et al., 2020; Sauer, 2018). In this context of conflicting positive and negative information and data about agribusiness in Brazil, the Brazilian population shapes its attitudes towards this subject.

This information and positive and negative data, when circulating among the population, affect the knowledge that individuals have on the subject. One should consider that attitudes, in turn, may be related to two types of knowledge: objective knowledge, defined as accurate scientific information or consolidated data the individual has in his/her memory, and self-assessed knowledge, that is, what the individual thinks she or he knows (Park et al., 1994). It is possible, for example, that individuals believe they have a great knowledge about a topic or object, when in fact they have a low objective knowledge (Kardes & Sanbonmatsu, 1993; Kruger & Dunning, 1999), which may possibly also occur in relation to Brazilian agribusiness. It is also possible that this information, positive or negative, may be received in different ways depending on the receiver (Vallone et al., 1985).

Although the population's attitudes towards Brazilian agribusiness are unexplored in the literature, the meaning of this term is controversial and subject of debate in academic circles and in Brazilian political speeches. For the sake of clarity, it is briefly presented how the term agribusiness was incorporated in Brazil.

Originally, the term agribusiness refers to the sum of all operations involved in manufacture and distribution of farm supplies, production operations on the farm, and the storage, processing, and distribution of farm commodities (Davis & Goldberg, 1957). The concept departs from the idea that agriculture was in time of changes, in which the adoption of new technologies based on science was a path to rural development (Melo, 2018). However, in Brazil the meaning of the term is debatable. There are those in who associate agribusiness only with large rural producers and large corporations. In this case, agribusiness would be opposed to family farming (Sauer, 2008; Valente, 2008). In fact, in the academic circle, some intellectuals argue that the term agribusiness was incorporated in Brazil as a substitute of "latifúndio", which is based, according to these intellectuals, on land concentration and exploration (Melo, 2018). Hence, they argue that the term was incorporated to improve the image of large properties (Melo, 2018; Sauer, 2008). Others argue that agribusiness includes all rural producers regardless of the size of their properties (Caume, 2009; Silva & Breitenbach, 2013). Intellectuals who share this vision of agribusiness argue that family farming and rural settlers do business and therefore are part of agribusiness (Valente, 2008). This discussion is important because it somehow influences political discourse and public policies. It is common in Brazil that left-wing political parties support the former meaning of agribusiness and right-wing parties support the later (Valente, 2008). It is acknowledged that this debate in the academic circle is far from an end and that the term "agribusiness" is controversial, but in this research the focus is not conceptual. The main interest is in understanding the population's attitudes towards Brazilian agribusiness, as it is known that individuals shape their attitudes even when there is no precise definition of the topic (Betsch et al., 2001).

Understanding the population's attitudes towards agribusiness is necessary as it affects electoral discussions and proposals and the development of government policies for the sector. It is known, for example, that large political parties tend to address issues in electoral

campaigns that have a greater convergence of opinion among the population for fear of losing votes (Dragu & Fan, 2016). Other studies have shown that the population's attitudes towards certain issues, such as genetically modified organisms, affect the formulation of public policies and investments related to these products (Zhao et al., 2019).

Previous literature has shown that populations' attitudes are related to different factors. However, in this research, the objective is to identify the impacts of objective knowledge and self-assessed knowledge about Brazilian agribusiness on the population's attitudes towards agribusiness. Both objective and self-assessed knowledge are related to attitudes (Fernbach et al., 2019; McPhetres et al., 2019; Motta et al., 2018). Thus, this research seeks to answer the following questions: do individuals who show a more positive attitudes towards Brazilian agribusiness have a greater or a lesser objective knowledge about agribusiness compared to those who show more negative attitudes? Do individuals who show a more positive attitudes towards Brazilian agribusiness have more or less self-assessed knowledge about the topic compared to those who show more negative attitudes? It is expected that the answers to these questions help decision-makers to develop more assertive informational policies for the sector.

2. Materials and methods

2.1 Sample and questionnaire

To achieve the proposed objective, this study used an online questionnaire applied to 600 participants. Data collection was carried out from September to October 2020 by a specialized company that holds a panel of respondents. The online recruitment of participants does not allow the portion of the Brazilian population without internet access to participate in the survey; therefore, readers are encouraged to interpret the results considering this limitation. Furthermore, it is possible that this study's sample differs from the Brazilian population in demographic characteristics. For this reason, the section 3.1 presents a brief comparison between the demographic characteristics of the sample and those of the Brazilian population. This comparison considered the variables age, gender, monthly income/social class, education, and region where people live.

The questionnaire was divided into two sections (Annex 1)[1]. In the first section of the questionnaire, the demographic characteristics were collected: age (open response), gender (male/female/other), social class/monthly income (class A - above BRL 15,676.00 / class BRL - between R$ 5,226.00 and BRL 15,675.00 / class C - between BRL 2,091.00 and BRL 5,225.00 / class D - between BRL 1,046.00 and BRL 2,090.00 / class E - up to BRL 1,045.00), education level (incomplete elementary school / complete elementary school / incomplete high school / complete high school / incomplete higher education / complete higher education / incomplete graduation education / complete graduation), and region of Brazil where the respondent lived (South, Southeast, Midwest, Northeast, North). Before starting the second section, the participants read a brief explanatory text on how the scales should be used in the responses (Annex 1).

In the second section, self-assessed knowledge, objective knowledge, participants' attitudes towards Brazilian agribusiness, and political positioning were collected. Self-assessed knowledge was measured by indicating the participant's level of knowledge about Brazilian agribusiness using a seven-point scale, where 1=vague understanding and 7=high understanding. To measure objective knowledge about Brazilian agribusiness, 41 statements were presented. Participants

[1] Annex 1 shows only the questions that were used to fulfill the objective, but other questions were also asked. The complete questionnaire can be obtained by contacting the first author.

indicated the level of veracity of each statement using a seven-point scale, where 1=definitely false and 7=definitely true. The statements were based on official data and consolidated scientific information on rural production and the economic, social, and environmental dimensions of Brazilian agribusiness. This information was validated by experts in the Brazilian agribusiness. In the section that measured objective knowledge, a question was added to assess the degree of attention while filling out the questionnaire. Participants should mark the answer "maybe false" for one of the statements. Participants who were not attentive were excluded from the sample.

To measure attitude, one item was used: "In your opinion, Brazilian agribusiness is:", and participants indicated their opinion of Brazilian agribusiness using a seven-point scale, where 1=very poor and 7=very good. Finally, the political position was measured by the question: "Politically, you consider your positioning:", and the participants indicated their positioning using a seven-point scale, where 1=totally left-wing and 7=totally right-wing.

Before applying the questionnaire, a pre-test was carried out with 24 individuals (different educational levels) to ensure that the final version contained questions that were easily understood by the participants.

2.2 Data analysis

Data were analyzed in two steps. In the first step, descriptive statistics was used to demographically characterize the sample and the main results regarding measurements of attitude, self-assessed knowledge, and objective knowledge. In this first step, a variable was also created to represent objective knowledge. For each of the 41 objective knowledge statements about Brazilian agribusiness evaluated using a seven-point scale a score ranging from -3 to 3 was assigned according to the alternative indicated by the participant. For example, for a statement whose answer was false, if the participant checked "definitely false" it would receive a score of "3;" if it checked "not sure," it would receive a score of "0;" if it checked "definitely true," it would receive a score "-3." Subsequently, the scores of the 41 statements were summed, resulting in a single score per participant in relation to objective knowledge that could range from -123 to +123.

At this step, groups of participants with negative, impartial, and positive attitudes towards Brazilian agribusiness were created. In the negative attitudes group were the participants who answered 1, 2, or 3 on the scale used to measure attitude; in the impartial attitudes group are the participants who answered 4; and in the positive attitudes group are the participants who answered 5, 6, or 7. This procedure reduces the amount of information, but less than 5% of the participants answered in the negative extreme of the item used to measure attitude. Keeping them in separate groups could result in complex analyses of the ordinal logistic regression model (see next paragraph). It is argued, therefore, that this procedure allowed simplicity in interpreting the model's results.

In the second step, an ordinal logistic regression model was tested. The dependent variable was attitude, and the independent variables were objective knowledge, self-assessed knowledge, and political positioning. Political positioning was included as a control variable. Age, gender, monthly income, education level, and region where the person lives were not included in the model as control variables because results of univariate statistical tests conducted a priori did not show significant effects of these variables on attitudes at a 15% significance level[2]. Analyses were performed using the software IBM SPSS Statistics for Windows, version 20.0.

[2] To verify whether these variables could affect attitudes, alternative models that included them as independent variables were tested. However, the coefficients of these variables were not significant in alternative models.

3. Results

3.1 Demographic characteristics of the sample

The initial sample consisted of 600 participants. However, 132 were excluded for not having marked the correct alternative for the question that tested attention while answering the questionnaire. Therefore, the final sample consisted of 468 participants. Table 1 shows the demographic characteristics of these participants. The mean age of participants was 35.8 years, with a standard deviation of 13.5 years.

Compared with demographic data for the Brazilian population, as reported in the National Household Survey (PNAD) (Instituto Brasileiro de Geografia e Estatística, 2021), the sample had some discrepancies. The mean age of the sample was higher than that of the Brazilian population, which is 32.6 years old. Obviously, one of the factors that led the sample to show a mean age higher than that of the Brazilian population is that children under 16 years of age did not respond to the questionnaire. The sample had a higher percentage of participants in social classes A and B, which together accounted for 19.9% of the sample; this percentage is 14.4% among the Brazilian population. The sample had a lower percentage of participants in social class C compared to the percentage of the population in this class, which is 55%. The sample had a higher percentage of participants in social classes D and E compared to the percentage of the population in this class, which is 25%. As for educational level, the sample had a percentage of participants who have incomplete elementary education of 1.8%; this percentage is around 30% among the Brazilian population. The sample also had a higher percentage of participants who had complete higher education than the Brazilian population: 26.2% and 16.5%, respectively. The sample had a percentage of women of 55.3%, which is higher than the value of 51.8% of women among the Brazilian population. The sample had a percentage of participants who lived in the Southeast region of 49.3%; among the population, this percentage is 42%. The sample had a percentage of participants living in the Northeast region of 20.3%, which is lower than the mean 27% among the general population. The percentages of sample participants living in other regions are similar as those of the Brazilian population. Therefore, readers are encouraged to interpret the results considering that the sample tends have older people, more women, higher income, and higher education levels compared to the Brazilian population. Finally, the percentage of people who declared themselves to be right-wing was greater than those who declared themselves on the left-wing (see Table 1).

3.2 Attitudes, objective knowledge, and self-assessed knowledge

The results presented in Table 2 show the percentage of participants who answered in each category of the seven-point scale used to measure self-assessed knowledge and the percentage of participants with negative, impartial, and positive attitudes towards Brazilian agribusiness. Overall, the results indicate a slightly high trend of a vague self-assessed knowledge about Brazilian agribusiness. This is because 69.1% of the participants scored 4 or less on the question scale that measured self-assessed knowledge. The results also indicate a high trend of positive attitudes towards Brazilian agribusiness. This is because 77% of participants scored 5 or higher on the scale used to measure attitude, and therefore are in the positive attitudes group. The mean of objective knowledge was 27.5 points, with a standard deviation of 16.7 points. Considering that the objective knowledge score could range from -123 to +123 points, these results indicate a slightly high trend of a high objective knowledge about Brazilian agribusiness.

Table 1 - Demographic characteristics of the sample.

Variable	Category	Percentage (%)
Gender	Male	44.7
	Female	55.3
Monthly income/social class	higher than BRL 15,676.00/A	3.4
	between BRL 5,226.00 and BRL 15,675.00/B	16.5
	between BRL 2,091.00 and BRL 5,225.00/C	39.1
	between BRL 1,046.00 and BRL 2,090.00/D	22.2
	up to BRL 1,045.00/E	18.8
Education level	Incomplete elementary school	1.8
	complete elementary school	2.5
	incomplete high school	6.3
	complete high school	29.2
	incomplete higher education	15.7
	complete higher education	26.2
	incomplete graduation	4.8
	complete graduation	13.5
Region where you live	Sul	15.4
	Southeast	49.3
	Midwest	7.7
	Northeast	20.3
	North	7.3
Political positioning	1 (totally left-wing)	5.6
	2	4.9
	3	10.7
	4	37.6
	5	16.2
	6	10.9
	7 (totally right-wing)	14.1

Table 2 – Percentages of responses for each category in the scale used to measure self-assessed knowledge and percentage of participants with negative, impartial, and positive attitudes.

Variable	Category	Percentage (%)
Self-assessed knowledge	1 (vague understanding)	14.3
	2	10.3
	3	14.3
	4	30.2
	5	19.6
	6	5.3
	7 (high understanding)	6.0
Attitude	1 (negative)	10.2
	2 (impartial)	12.4
	3 (positive)	77.4

3.3 Impact of objective knowledge and self-assessed knowledge on the population's attitudes towards the Brazilian agribusiness

The ordinal logistic regression model tested the impacts of objective knowledge, self-assessed knowledge, and political positioning on the population's attitudes towards Brazilian

agribusiness. The model fit information was $\chi^2(3)=91.420$, $p<0.000$. The information about the fit quality of the model were Pearson's Chi-square test $\chi^2(805)=736.778$, $p=0.959$, and deviation test $\chi^2(805)=489.487$, $p=1.000$. Nagelkerke's pseudo R-squared was 0.237. Finally, the parallel line test was $\chi^2(3)=0.791$, $p=0.852$. These results show a satisfactory model and indicate that the assumptions of the ordinary logistic regression model were not violated (Denham, 2016).

Table 3 shows the results of the model's regression coefficients. The three independent variables contributed to the model, with coefficients that were statistically different from zero at the level of $P<0.05$. The three variables had a positive impact, indicating that the increase in the objective knowledge scale, the increase in the self-assessed knowledge scale, and a more right-wing political positioning results in an increased probability of an individual showing a more positive attitude scale towards to Brazilian agribusiness. The exponential coefficient (β exp) shows the odds ratio of these impacts. For every one-point increase in the objective knowledge scale, there is a 2% increase in the probability that an individual having a more positive attitude. For every one-point increase in the self-assessed knowledge scale, there is a 26% increase in the probability that an individual having a more positive attitude. Finally, for every one-point increase in the political positioning, there is a 93% increase in the probability that an individual having a more positive attitude.

Table 3 - Regression coefficient model for objective knowledge, self-assessed knowledge, and political positioning on the population's attitudes towards Brazilian agribusiness.

Variable	β	Standard error	Wald	DF	P	CI 95%	β (exp)
Objective knowledge	0.017	0.008	4.576	1	0.032	0.001-0.032	1.02
Self-assessed knowledge	0.236	0.076	9.652	1	0.002	0.087-0.385	1.26
Political positioning	0.659	0.086	58.416	1	0.000	0.490-0.828	1.93

4. Discussion and final considerations

The objective of this work was to identify the impacts of objective knowledge and self-assessed knowledge about Brazilian agribusiness on the population's attitudes towards the agribusiness. This study applied a questionnaire that measured demographic characteristics, attitudes, objective knowledge, and self-assessed knowledge to a sample of the Brazilian population. The results show that the sample tended to show a vague self-assessed knowledge, a slightly high objective knowledge, and positive attitudes towards Brazilian agribusiness. The results of the ordinary regression model show that the greater the objective knowledge and the greater the self-assessed knowledge, the greater the probability of an individual having a more positive attitudes towards Brazilian agribusiness. Political positioning was included as a control variable, and the results show that the further to the right on the political spectrum the individual declared himself/herself, the greater the probability of showing more positive attitudes towards the Brazilian agribusiness. Next, the main results are discussed in detail, and the implications and limitations of the research are presented.

The first main result refers to attitudes towards Brazilian agribusiness. The question that measured attitude was answered using a scale that captures implicit aspects, what "first comes to mind" of people. The results show that the largest portion of the sample (77.4%) has positive attitudes towards Brazilian agribusiness. A possible explanation for this result is that, when circulating among people, information on the positive aspects of Brazilian agribusiness, such as its economic relevance, stands out more than the negative aspects in the formation of

attitudes in the largest portion of the population sample. In fact, it is common for the discourse in the main media and in television campaigns that agribusiness is the driver of the Brazilian economy (Bezerra, 2012; Costa & Oliveira, 2020), which indicates that the portion of the Brazilian population that "consumes" this discourse can have their attitudes affected. Another possible explanation is that the portion of the population that shows positive attitudes must understand that environmental and social problems are not generalized to agribusiness as a whole and that negative aspects are specific. It is also possible that this portion of the population shows an interpretation of agribusiness that is beyond the view of social movements that fight for agrarian reform and in some academic segments that family forms of production in agriculture are irreconcilable and incompatible with agribusiness (Caume, 2009).

The second main result refers to the impacts of objective knowledge and self-assessed knowledge on attitudes towards Brazilian agribusiness. The results show that the greater the objective knowledge and the self-assessed knowledge, the greater the probability of an individual showing more positive attitudes towards Brazilian agribusiness. Theoretically, these results confirm similar studies that found a relationship between objective knowledge and self-assessed knowledge and the population's attitudes towards different topics (Fernbach et al., 2019; McPhetres et al., 2019; Motta et al., 2018). However, unlike the results of this study, these studies indicated that a high self-assessed knowledge is associated with extremely positive attitudes but with a low objective knowledge.

The third main result refers to the impacts of political positioning on attitudes towards Brazilian agribusiness. A possible explanation is that individuals with a political position on the left interpret the meaning of the term agribusiness differently than those with a political position on the right. In fact, it is common in the Brazilian political discourse of the political spectrum to the left that agribusiness is associated with large rural producers in opposition to family farming (Sauer, 2008; Valente, 2008). In this discourse, agribusiness is interpreted as a "villain" (Caume, 2009), and therefore individuals who "consume" this discourse tend to show more negative attitudes towards the topic.

Our results show that political positioning is the factor that has the greatest impact on attitudes. This high impact can be explained by confirmation bias and the halo effect (Kahneman, 2012). When the human being's judgment is governed by the confirmation bias, the individual will seek to rely on information that confirms the person's own beliefs, even if this information is of dubious origin or does not have scientific proof. In addition, the halo effect makes the evaluation that individuals have of a certain political authority, whether it is good or bad, affects the judgment of the credibility of the information that this authority transmits.

The results have important implications for the development of information policies in the sector. A decision-maker who wants the attitudes towards Brazilian agribusiness to be more positive must develop strategies that increase the self-assessed and objective knowledge of individuals in relation to the subject. Furthermore, it is essential that critical thinking be increasingly developed among the population. Although the results do not point out which actions would increase the population's level of objective knowledge and critical thinking, including teaching about agribusiness based on scientific evidence in the Brazilian education system could help in this process. These educational actions are important because they help the population to develop attitudes based on scientific evidence (Cui & Shoemaker, 2018; McPhetres et al., 2019). For individuals to develop attitudes based on scientific evidence, it is also important that the media are encouraged to incorporate such evidence into "their speeches" and that the dissemination of fake news is discouraged (Cui & Shoemaker, 2018). However, even performing actions that disseminate objective knowledge about Brazilian agribusiness,

one should not expect convergence of attitudes towards the issue, as political positioning will likely continue to affect the population's attitudes. The results show that political positioning is an important predictor of attitudes. This study does not share the opinion that the Brazilian population must necessarily have positive attitudes towards agribusiness; on the contrary, divergent attitudes and opinions must be respected. However, it is necessary that knowledge based on scientific evidence (both positive and negative information) be disseminated among the population, so that individuals can shape their attitudes and decide whether or not to support the agribusiness based on available scientific evidence.

This work has some limitations that should be considered in future research. The first limitation refers to the questions used to measure objective knowledge. Although this study conducted an extensive survey of data and information on Brazilian agribusiness and experts validated the issues, it is possible that not all aspects of agribusiness are included, as the term is obviously broad. It is suggested that future research contemplate other questions to measure objective knowledge and test the impacts on population attitudes. In this regard, it is also important to recognize the idea of knowledge and social imagery (Bloor, 1991). According to this idea it is not possible to separate the knowledge and the society that creates it (Spiess, 2010). Hence, the objective knowledge is embedded in the society that creates it. The second limitation refers to the sample. Compared to the Brazilian population, the participants of this study's sample are older, predominantly women, have a higher income, and are more educated. Therefore, the characteristics of the sample include sources of variation that possibly make it unfeasible to generalize the results. In general, the differences between the demographic characteristics of the population and the sample are related to online recruitment. It is suggested that future studies consider random sampling, as this could improve the representativeness of the sample and provide a more complete scenario of the population's attitudes towards Brazilian agribusiness. It is also suggested that future research explores the meaning that people attach to the concept of agribusiness. In this regard, interviews followed by content analysis of the data might provide a deeper understating of how people interpret the concept of agribusiness.

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Annex 1

Demographics

1- How old are you?

2- Gender: ( ) Female ( ) Male ( ) Other

3- According to your income, what is your social class?

( ) A - higher than BRL 15,676.00

( ) B - class B - between BRL 5,226.00 and BRL 15,675.00

( ) C - class C - between BRL 2,091.00 and BRL 5,225.00

( ) D - class D - between BRL 1,046.00 and BRL 2,090.00

( ) E - class E - up to BRL 1,045.00

4- What is your maximum educational level?

Elementary school: ( ) Complete ( ) Incomplete

High school: ( ) Complete ( ) Incomplete

Higher education: ( ) Complete ( ) Incomplete

Graduate education: ( ) Complete ( ) Incomplete

5- Region where you live:

( ) South

( ) Southeast

( ) Midwest

( ) North

( ) Northeast

Self-assessed knowledge

Next, we will interpret your understanding of agribusiness using a seven-point scale. To ensure you understand the scale, this section explains what the three levels of seven are for the necessary understanding using the example of how a crossbow (weapon) works. Read each description to get an idea of how to use this pattern. As you will see, a 7 implies deep and detailed knowledge, a 1 implies very little knowledge, and a 4 is in between.

Level 7 knowledge: A person with a level 7 knowledge on crossbow can tell you all about their parts and how they work together. This person may say that a crossbow has a rigid and flexible piece of metal like a bow with a string or a strong line; that the crossbow is permanently mounted on a block of wood or metal; and that the wire is pulled back by something that offers a mechanical advantage - a lever, a small block and a crank, or a crank wound around a spool that pulls a wire attached to the main wire. The bowstring is held by a pin connected to a trigger and an arrow is placed in front of it. The pin is directly connected to the trigger, so when you pull the trigger, it rotates around such a point that the end moves down and releases

the string from the bow. When the pin releases the string, the bow unfolds very quickly, quickly transmitting the energy stored in the flexed bow to the arrow.

Level 4 knowledge: A person with a level 4 knowledge knows that the crossbow is a fixed bow and arrow arrangement; that it has more power than a regular bow and arrow, because it allows pulling the string harder and hooking it instead of holding it, and which is then released by a trigger.

Level 1 Knowledge: A person with a level 1 knowledge knows what a crossbow looks like and what it does (shoots arrows).

Using the scale you just learned, please indicate the level of knowledge you have about Brazilian agribusiness.

Vague Understanding 1 2 3 4 5 6 7 High Understanding

Objective knowledge about agribusiness[3]

Now, a series of statements about Brazilian agribusiness will be presented. Please indicate the answer using the seven-level scale, where 1 is definitely false, 2 is probably false, 3 is maybe false, 4 I am not sure, 5 is maybe true, 6 is probably true, and 7 is definitely true. Please answer the questions as best as you can. Do not use external resources for assistance.

1- All Brazilian agribusiness production is exported. (False).

2- Brazilian agribusiness contributes to the positive balance of the Brazilian trade balance. (True).

3- The main exporting states of agricultural products in Brazil are: Mato Grosso, São Paulo, and Paraná. (True).

4- The main agricultural products exported by Brazil are soy, meat, and forest products. (True).

5- Brazil is the third largest producer of soy in the world. (False).

6- The number of cattle per hectare in Brazil has been decreasing over the years. (False)

7- Bees are important for agricultural production, as in addition to the production of honey and other bee products, they are responsible for pollination. (True)

8- Brazil has government programs aimed to mitigate greenhouse gases. (True)

9- The change in land use was responsible for mitigating the emission of greenhouse gases. (True)

10- By law, rural producers are required to maintain a legal reserve area on their properties in order to contribute to the preservation of the environment. (True)

11- In Brazil, rural technical assistance services are provided solely and exclusively by private entities. (False)

12- Weeds can be fought with pesticides. (True)

13- In Brazil, the bovine herd is bigger than the chicken one in number of animals. (False)

[3] *Correct answers are in parentheses at the end of each statement; the correct answers were presented to the participants only after completing the questionnaire.*

14- Brazil has more than 50% of the territory covered with native vegetation. (True)

15- The ABC Plan is a literacy plan for rural producers. (False)

16- Brazil is the main exporter of cellulose in the world. (False)

17- In Brazil, there are more people living in rural areas than in urban areas. (False)

18- The size of the property is a determining factor for the producer to be considered a family farmer. (True)

19- In Brazil, there are exclusive government programs to assist family farmers. (True)

20- The cultivation of vegetable gardens and orchards for their own consumption in urban residences are examples of activities related to family farming. (False)

21- The USA is the main buyer of Brazilian agricultural products. (False)

22- Brazil has programs to fight deforestation and fire in the Amazon and Cerrado regions. (True)

23- Brazilian chicken production is mainly concentrated in the South region. (True)

24- In Brazil, less than half of the territory is occupied by agricultural production. (True)

25- Transgenic animals can carry out photosynthesis. (False)

26- Transgenic foods do not have DNA. (False)

27- Chickens from farms receive hormones that help their growth. (False)

28- Hydroponics is an organic cultivation technique. (False)

29- Agribusiness consists of the large-scale production and marketing of commodities. (False).

30- Artificial insemination is a forbidden technique in bovine reproduction. (False).

31- Biotechnology consists of the study and production of genetically modified organisms. (True).

32- Some species of corn do not have roots. (False).

33- Inoculants are used to facilitate the fixation of nitrogen in the soil. (True).

34- When raising cattle, only dairy cows can be confined. (False).

35- This question is designed to verify whether the questions are being read carefully.

36- Ethanol is an alcohol produced from sugarcane. (True).

37- Pig waste can be used in energy production. (True).

38- Less than half of Brazilian rural properties receive rural technical assistance. (True).

39- Despite having decreased for many years, in recent years deforestation in the Amazon Region has increased again. (True).

40- Most Brazilian rural producers are classified as family farmers. (True).

41- The granting of credit from Pronaf - National Program for Strengthening Family Agriculture - has decreased since its creation. (False).

42- The Food Purchase Program (PAA) is a cash transfer made by the federal government to family farmers in a situation of food insecurity aiming the purchase of food for their own consumption. (False).

Attitudes towards Brazilian agribusiness

In your opinion, Brazilian agribusiness is:

Very poor 1 2 3 4 5 6 7 Very good

Political positioning

Politically, you consider your position:

Totally Left-wing 1 2 3 4 5 6 7 Totally Right-wing