



## **Supply of safe beef in Brazil: a discussion about the efficacy of the traceability system implemented in the production chain**

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### Abstract

Problems related to food safety, associated to animal health, such as the avian flu and the mad cow disease (Bovine Spongiform Encephalopathy – BSE), have gained prominence since the years 1990 and influenced not only the perception of consumers about the quality of animal based food products, but also the international trade policies in several countries. To meet the requirements of countries that started to demand traceability in the food production chains, in 2002, Brazil developed and implemented the Brazilian System for the Identification and Certification of Bovine and Bubaline Origin – SISBOV - a system for monitoring the production chain as a whole, with mandatory accession for cattle farmers exporting to countries with that requirement. Therefore, in this complex institutional environment, it is worth investigating the opinion of the economic agents involved in the beef production chain in Brazil about the effectiveness of SISBOV. A study was conducted based on the application of the qualitative and quantitative methodology of the Discourse of the Collective Subject (DCS), which allows identifying consensus about a theme or phenomenon based on the responses of a group of individuals. The following groups of economic actors involved in the cattle activity were intentionally defined for a nationwide survey, which constituted a non-probabilistic, convenience sample, by spontaneous adhesion: cattle farmers, slaughterhouses members of the Brazilian Association of Meat Exporting Industries (ABIEC); companies certifying cattle farms for export; associations and class entities directly related to actors in the beef production chain; Brazilian government agencies focused on food inspection and control. The study has evaluated the beef production chain actors' opinion about SISBOV efficacy. For that purpose, the methodology of the Discourse of the Collective Subject (DCS) was applied to a sample of 34 actors of the production chain. From the interviews conducted for the study it was evidenced that there is resistance to accession to the traceability system mainly because of the significant investments required from cattle farmers, with no guarantee of overprice for the traced cattle, nor financial return. Respondents indicated that the system is targeted only at markets requiring traceability; it is subject to the influences of international trade and political agreements, besides being ineffective due to regulatory failures. Those aspects demonstrate the dissatisfaction of the players in this market in relation to the expectations they had about SISBOV. Respondents also criticize government coordination, considered inefficient and with structural deficiencies in the control and regulatory services. From the perspective of possible benefits brought by SISBOV, comments are made about its contribution for more effective management of herds and farms in the case of accession. Comments from the respondents suggest that they expected that SISBOV would promote coordinated actions among all elements of the meat agribusiness chain. Thus, the proposal of greater articulation among the members of the productive chain of bovine meat in the country

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arises, including the government at all levels, to address improvements and adjustments to the SISBOV design, promoting the coordination of all links within the production chain.

Keywords: supply; beef, traceability system, production chain, food safety

## INTRODUCTION

Problems related to food safety, associated to animal health, such as the avian flu and the mad cow disease (Bovine Spongiform Encephalopathy – BSE), have gained prominence since the years 1990 and influenced not only the perception of consumers about the quality of animal based food products, but also the international trade policies in several countries. The European Union (EU), for instance, created a series of requirements to be met by products imported by the region, due to the international episodes that involved the commercialization of contaminated beef (MENDES, 2006). To meet those requirements, Brazil developed and implemented the Brazilian System for the Identification and Certification of Bovine and Bubaline Origin – SISBOV - a system for monitoring the production chain as a whole (BRASIL, 2002a; MENDES, 2006; VELHO et al., 2009).

In fact, problems of food contamination derived from livestock raw materials are very difficult to treat and control, taking into account the emergence of new pathogenic microorganisms, in addition to those already known, with broad scope of action and resistant to antibiotics. That requires dynamic monitoring systems and the involvement of national and international agencies in food inspection (SOFOS, 2008 and 2009).

There are several government agencies that monitor and control eventual food contamination problems, such as the Food and Drug Administration (FDA), World Health Organization (WHO), Codex Alimentarius Commission (CCA), United Nations Food and Agriculture Organization (FAO), National Health Surveillance Agency (ANVISA, in Brazil), among others. They are continuously searching for refined and rapid methods for detection of pathogenic microorganisms and for control of foodborne diseases (FBDs), by means of risk assessment and control of critical points in production processes.

Unlike bacterial contamination, Bovine Spongiform Encephalopathy (EBB), known as the "mad cow disease", originates from farms, where healthy cattle may be fed with animal food prepared with meat and bones from contaminated livestock, so that it becomes a vector of contamination (NARDONE, 2003).

In those cases, the existence of a traceability system (TRS) that allows the tracing back and forth in the production chain, including the origin of used inputs, reduces the likelihood of infected meat and meat based products reaching the end consumer.

In addition to that aspect of public health, a TRS, by increasing the flow of information along the chain, reduces the incidence of opportunistic behavior among actors in the sector, increasing competition, with impact on prices (RUBIN, ILHA, WAQUIL, 2008), and in the international trade. In this sense, a TRS is a mechanism to deal with non-tariff barriers based on the requirement of traceability (BROWN et al., 2001).

In Brazil, accession to the Brazilian System for the Identification and Certification of Bovine and Bubaline Origin (SISBOV), which is mandatory for cattle farmers exporting to countries requiring traceability, on one hand implies the incorporation of a set of controls and information technology in all links of the beef productive chain, increasing the complexity of the cattle activity management and its costs within the scope of each agent. On the other hand, it demands nationwide coordination and control, taking

into account the size of the herd and its geographical distribution, given the continental dimensions of the country (LOPES, SANTOS, 2007).

According to the latest agribusiness census (BRASIL, 2006b), accession to SISBOV is still very low, suggesting that, although theoretically the Brazilian system is adequate, in practical terms it faces difficulties in achieving the objectives it proposes, such as breaking the non-tariff barriers of the EU against Brazilian beef.

Therefore, it becomes important to evaluate the opinion of the economic agents involved in the national beef production chain and in the export of its products about the operability and functionality of SISBOV, seeking to understand the reasons for the low adhesion of producers to the system, which is a gateway to the international market.

In fact, from the late 1990s, with the impact caused by diseases such as BSE, transmitted to humans through the consumption of contaminated beef (NARDONE, 2003; MACHADO, NANTES, 2004), governments in several countries started to adopt standards and impose stricter requirements for the international commercialization of this food (CÓCARO, JESUS, 2007), impacting producers, intermediate traders and public agencies, to ensure a safe supply for human consumption (SPERS, 2003).

The EU, seeking to protect its consumers, started to require the traceability of local and imported cattle by the region (MACHADO, NANTES, 2004; MONTEIRO, CASWELL, 2004; RESENDE FILHO, 2008), creating a non-tariff barrier to the Brazilian exports and to the ones from other countries. Thus, aiming at guaranteeing the quality of the supplied foods by means of the characterization of the origin, the sanitary status records and the productive protocols, the TRS have become an essential condition for continuous and safe access to international markets (BROWN et al., 2001).

As pointed out by Furquim and Cyrillo (2012), the EU is an important market for Brazilian beef exports, and, due to the requirements of that trading bloc, there was a need to implement a TRS in the Brazilian production chain, under the coordination of the government (SILVA, BATALHA, 2000), implying higher production costs (PITELLI, MORAES, 2006; VELHO et al., 2009).

In 2002, by means of Normative Instruction (NI) n. 01, of January 9, the Ministry of Agriculture, Livestock and Food Supply (MAPA) instituted SISBOV (BRASIL, 2002a; MENDES, 2006), in order to meet the EU traceability requirements for imports of Brazilian beef (SARTO, 2002).

Designed to ensure the accreditation of Brazilian beef exports to the EU, SISBOV includes in its structure a database with detailed information about the herd, how it is handled, and its movement in the national territory (BRASIL, 2002a).

SISBOV was implemented with the support of the Agricultural Defense Secretariat (SDA) of MAPA, responsible for managing the National Data Base (BND) and for the procedures for accrediting the farms certifying entities, producers and involved cattle. (BRASIL, 2002a).

With the implementation of SISBOV, the guidelines for traceability in the bovine and buffalo production chain were established, aiming at the registration and identification of herds, allowing the cattle to be tracked from birth to slaughter. The system adhesion is voluntary to the domestic market, being mandatory for beef and buffalo exports to markets that require traceability in the productive chain (BRASIL, 2002a).

All animals registered in SISBOV must have an identity document, named Animal Identification Document (DIA), issued by a certifying entity, containing the farm of origin, each animal identification, gender, date of birth or arrival at a given farm, feeding and breeding system, control and recording of movements (sales, purchases, deaths and

transfers to other farms), besides sanitary data, such as treatments, vaccines, among others (CÓCARO, JESUS, 2007). Within SISBOV, the DIA permanently certifies the origin of the cattle, individually identified and registered in the National Data Base (BND), proving that they come from legally established farms, rural properties, favoring their characterization and monitoring throughout the national territory.

On July 14, 2006, through the NI n. 17, MAPA presented a new operational structure for SISBOV, stressing that the adhesion to the Traceability Service of the Bovine and Bubaline Production Chain, the New SISBOV, is voluntary for cattle farmers in general, but it is mandatory for those who are interested in exporting beef and buffalo to countries that require traceability in the production chain (BRASIL, 2006c).

With that NI, which maintained the acronym SISBOV to designate Traceability Service of the Bovine and Bubaline Production Chain, emerges the concept of SISBOV Approved Farm (ERAS), whose main requirements and characteristics are: farm register, farmer register, basic production protocol, term of adhesion to SISBOV, recording of the inputs used in the property, individual identification of 100.0% of the bovines and buffaloes of the farm, control of cattle movement, supervision of a single certifier accredited by MAPA and periodic inspections by the certifying entity (BRASIL, 2006c; CÓCARO, JESUS, 2007).

Cócaro and Jesus (2007) also mention that, with the New SISBOV, all bovines and buffaloes born in ERAS will be, obligatorily, identified individually before the first movement, in the period of time between weaning and, at the most, ten months of life. Registrations of those animals are made at the BND, being also necessary the registration of all the inputs used in the property during the productive process, which must be maintained for a period of five years.

According to NI n. 65 of December 16, 2009, SISBOV started to receive the designation of System for Bovine and Bubaline Identification and Certification, with the same acronym (BRASIL, 2009a).

Even with the traceability system implemented in the beef productive chain for export, in 2005 there was an embargo of Brazilian exports to the EU and other countries, due to the outbreaks of foot-and-mouth disease in some Brazilian regions (AGRONOTÍCIAS, 2005). This event could be seen as an indication of ineffectiveness of the agricultural and cattle defense measures and the SISBOV, if it were not for the fact of the low adhesion of the cattle farms to the referred system, as shown by the 2006 Census of Cattle and Agriculture (BRASIL, 2006b; FURQUIM, CYRILLO, 2012).

In March 2017, dozens of federal inspectors were arrested after an investigation named “Weak Flesh”, due to the acceptance of bribes to ignore the adulteration or expiration of processed meat-based products and falsified sanitary permits, which involved food-processing companies of different sizes all over Brazil (LE MONDE, 2017; THE NEW YORK TIMES, 2017). It is worth mentioning that since its implementation, the accession to SISBOV has been quite low in Brazil. In January 2016, there were 1,640 farms authorized for export to the EU (SAFRA, 2016). In 2012, 1,948 farms were accredited for export to that trading bloc (CORREIO DO ESTADO, 2012).

Thus, in this complex institutional environment - which seeks to manage the market failures inherent to the beef production and export sectors - it is worth investigating the opinion of the economic agents involved in the beef production chain in Brazil about the effectiveness of SISBOV, and about the low accession of the national cattle farmers to the system.

The objective of the study was to investigate the opinion of cattle farmers, slaughterhouses members of the Brazilian Association of Meat Exporting Industries

(ABIEC), companies certifying cattle farms for export, associations and class entities directly related to actors in the beef production chain, and Brazilian government agencies focused on food inspection and control, about government measures and services aimed at safe beef production, mainly regarding SISBOV.

## METHODOLOGY

The current study used the qualitative and quantitative methodology of the Discourse of the Collective Subject (DCS), which allows the identification of consensus about a theme or phenomenon from the responses of a group of individuals. With this methodology, the answers obtained are classified through the recognition of Key Expressions (KE) and Central Ideas (CI), identified in the processing of the statements and used in the elaboration of speeches representative of the ideas of the group (Lefèvre and Lefèvre 2003).

There were defined, intentionally, for a nationwide survey, the following groups of economic actors involved in the cattle activity, which constituted a non-probabilistic, convenience sample, by spontaneous adhesion: cattle farmers, slaughterhouses members of the Brazilian Association of Meat Exporting Industries (ABIEC), companies certifying cattle farms for export, associations and class entities directly related to actors in the beef production chain, and Brazilian government agencies focused on food inspection and control, such as the MAPA and the Ministry of Health (MS). Respondents who did not belong to the selected categories were excluded.

Electronic mail was used to send out invitations to take part in the research, together with the information and guidelines for answering the questionnaire using the QLQT Online software, version 1.0. The survey was conducted during October and November 2011. For this study, the answers to a specific question about the actors' knowledge about the effectiveness of SISBOV were analyzed.

The study was approved by the Ethics in Research Committee of the Pharmaceuticals Sciences College of the University of São Paulo according to Parecer CEP/FCF/146/2011, Protocolo CEP/FCF/595, CAAE: 0043.0.018.000-11.

## RESULTS

The study was based on a sample of 34 individuals (about 8.0% of all invitations sent), belonging to the five different categories of selected actors and related to the beef cattle activity in Brazil. Among the respondents, 85.0% were male, 47.0% were cattle farmers, and 97.0% had, at least, attended college, indicating a high level of education, being most of them vets / zoo technicians (41.0%), followed by engineers (24.0%).

From the answers to the proposed question, five CI categories were established, as it can be observed in the following table.

Table 1 – Distribution of the frequency of CI categories from the discourses of different actors in the Brazilian beef production chain, from the question “Do you think SISBOV is fulfilling its role? Please, make a few comments about it” – Brazil, 2011.

Category		Answers	%
A	SISBOV is not fulfilling its role	20	47,6
B	SISBOV is partially fulfilling its role	4	9,5
C	SISBOV is fulfilling its role	9	21,4
D	Suggestions for improvement to SISBOV	8	19,0
E	No opinions about SISBOV being or not fulfilling its role	1	2,4
<b>Total</b>		42	100,0

The proposed question aimed at identifying, in the perception of the respondents, whether SISBOV is fulfilling its role of enabling the export of Brazilian beef. Taking into account the purpose of the study, the question allows considering whether, in practice, SISBOV is consistent with its objectives and whether it is effectively operating in Brazil.

Among the answers to the question, 48.0% of the total indicates that SISBOV is not fulfilling its role. The system is considered expensive, ineffective, with no satisfactory results, mainly in terms of financial returns to cattle farmers. The slaughterhouses are the ones that establish the values to be paid to the farmers, without any guarantee of better prices for the traced cattle.

The respondents emphasize that SISBOV fundamentals are appropriate in its design, but its operation does not keep up with them. It is further believed that if it were fulfilling its role, there would be no additional imposition by EU government agencies.

There were also responses (10.0% of the total) that mentioned that SISBOV only partially fulfills its role, since there are failures in its operation. According to the respondents, the points to be adjusted - systematization and frequency of audits by the government - would contribute to achieving the objectives of the system, in the case of beef exports and cattle sanitary control.

On the other hand, about 21.0% of the answers to the question indicate that SISBOV is fulfilling its role. According to the respondents, the system meets the EU international requirements, and the cattle farmers who choose to join it benefit from its practices to improve their routines in managing the herds of their farms.

Among the suggestions for improvement of SISBOV, observed in 19.0% of the responses, the respondents mention that it should be constantly improved, at the same time that there should be greater awareness of the producers and financial support from the government. Still according to the answers, the MAPA would have to supervise the performance of the certifying companies and farms so that SISBOV could achieve greater international recognition.

## DISCUSSION

In Brazil, the institutional framework focused on food safety encompasses from basic norms (BRASIL, 1969) until the National System of Sanitary Surveillance, conducted by ANVISA (BRASIL, 1999) to control and supervise the production, distribution and commercialization of food. The rules that regulate food supply and safety in Brazil are consistent with international standards (FURQUIM, CYRILLO, 2012), including labeling (BRASIL, 2002b e 2005), which, even without requiring full traceability, make it mandatory the complete food identification information, including nutritional aspects, and the names of manufacturers.

Both MAPA and ANVISA hold responsibility for the technical standards of sanitary safety of foods supplied in Brazil, even of beef, constantly reviewing them, and seeking their improvement and the guarantee of safe food. In particular, SISBOV was

implemented as a response to the EU requirements, due to the problems generated by the "mad cow" epidemic (MOE, 1998; GOLAN et. al., 2004; BENNET, 2008).

The system defines the rules for registration and control of cattle for export, similar to the rules created by the EU for internal transactions. Those rules, which seek to monitor the cattle movement and inputs used in production, in fact are suitable for confined breeding. However, in Brazil, where such technology is not usual, and cattle are raised freely, in large areas of pasture, naturally fed, traceability, besides having difficult operation, is inefficient.

Although MAPA (BRASIL, 2002a) has made the service available and outlined the necessary requirements to ensure traceability, the necessary investments are a responsibility of the cattle farmers themselves, leading to additional costs in their activities (CÓCARO, JESUS, 2007; VENTURA, 2010), without improving the quality of the finished product. That is a critical aspect, which compromises the scope and effectiveness of the system in Brazil. On the one hand, there is the extent and dispersion of production in all geographic areas of the country, and, on the other hand, there are the investments to be made for the implementation of the TRS in the farms.

From the interviews conducted for the study, it was evidenced that there is resistance to accession to this system mainly because the investments required from the cattle farmers are significant, with neither guarantee of overprice for the traced cattle, nor of financial return. Consequently, the number of traced cattle in the country is small, and the accession to SISBOV is basically observed among the most capitalized cattle farmers.

Another critical aspect is pointed out by the research participants: besides the investments to be made in the farms to implement SISBOV in the productive chain, producers also resist to join the system because of the specific nature of those investments, which become irrecoverable in the case of giving up production for export, or in downturns in beef exports, characterizing the "sunk costs" effect, since the domestic market does not pay overprice for traced cattle.

Despite the importance of beef for the national economy: 1.4 million tons or US\$ 5.5 million in 2016 (ABIEC, 2017), the high degree of complexity in its productive chain shows a situation of information asymmetry among the different participants, specially between cattle farmers and slaughterhouses (URSO, 2007), an asymmetry that has been minimized in the perspective of the slaughterhouses and accentuated in the perspective of the farmers, who, with the implementation of SISBOV, became hostages to the buying agent of their product.

In this sense, some respondents perceive SISBOV as a system that does not increase the transparency in the transactions between the different actors of the productive chain. On the contrary, it is understood as a strict inspection system, which limits and exposes the actions of producers, restricting any opportunistic behavior (such as management failures, clandestine slaughtering, among others), that could arise from them, due to information asymmetries.

In that context, the large number of farmers, spread all over the country, and the reduced number of slaughterhouses (BRASIL, 2006b) configure an oligopsony situation (MARTINS et. al., 2005; GOLANI, MOITA, 2010), which was highlighted by the respondents, especially regarding the fact that the slaughterhouses are ones responsible for the establishment of prices in the commercial transactions.

Another market failure in the beef production chain may be noticed in cases of not complying with the basic rules for cattle health guarantee. Although MAPA acts regulating the production both from the point of view of the cattle sanitary aspects and the control of the legal practices related to the quality of the supplied meat (BRASIL,

2001; 2002a; 2007b), according to the respondents, there is still clandestine slaughtering and the supply of products with lesser quality.

Those episodes lead to a negative perception about SISBOV. Respondents indicated failures in its implementation, since it was not designed and implemented in a way consistent with the features of the national cattle industry, without taking into account the changes and adjustments in its regulatory aspects (BRASIL, 2006c), which have contributed to generate discredit and distrust from the domestic producers and importers.

The embargo on the exports of Brazilian beef due to outbreaks of foot-and-mouth disease in 2005 (AGRONOTÍCIAS, 2005), and more recently, the “Weak Flesh” investigation (LE MONDE, 2017a; THE NEW YORK TIMES, 2017) appear as evidences of the system's ineffectiveness.

It should be noted that in the national context uncertainties regarding the production and delivery of the final product may arise, besides information asymmetries between the intermediate (the slaughterhouses) and the inspection agent. That promotes the rising of market and government failures, especially corruption.

That possibility was real with the police operation called "Weak Flesh Investigation", triggered in March 2017, against Brazilian slaughterhouses suspected of falsifying the quality of commercialized meat, both in the domestic market and for export, in complicity with MAPA agents (LE MONDE, 2017a). In June 2017, new allegations of product adulteration led to an embargo on Brazilian exports of beef by the United States (LE MONDE, 2017c).

Such illicit maneuvers severely compromise the credibility of Brazilian beef in the domestic and international markets, with detriment of the image of the sector and suspension of imports, leading to declines in export volumes and values (LE MONDE, 2017b), which damages Brazil's position as the world's largest beef exporter (LE MONDE, 2017c; THE NEW YORK TIMES, 2017).

From this perspective, questions arise regarding ethics in the performance of sanitary inspectors, the effectiveness and validity of the supervision and control mechanisms implemented by Brazil to ensure the supply of safe food (EL PAÍS, 2017).

Those aspects, however, do not solve the problems pointed out by the respondents in indicating that the system is focused only on markets that require traceability. It is also considered as subject to the influences of international trade and political agreements, besides being ineffective due to regulatory failures. Those features may indicate the dissatisfaction of the players in the sector, as far as the expectations they had about SISBOV are concerned.

Respondents also criticize government coordination, which is considered to be inefficient and presenting design failures in the cattle sanitary control and defense services.

From the perspective of possible benefits brought by SISBOV, there were comments about its contribution to a more effective management of herds and of the farms, in cases of accession. However, the respondents' comments suggest that they would have higher expectations about the system. They expected, for instance, the system to promote coordinated actions among all elements of the meat agribusiness chain, and that it should not only apply to farms.

Thus, the proposal of greater articulation among the members of the productive chain of bovine meat in the country arises, including the government at all levels, to address improvements and adjustments to the SISBOV design, promoting the coordination of all links within the production chain.



## CONCLUSION

The Brazilian agribusiness has traditionally been important for guaranteeing surpluses in the trade balance and for the inflow of foreign currency into the country. In that context, beef plays a significant role because besides having a proven nutritional importance, it has a high share in the value of total Brazilian exports.

SISBOV, whose accession is voluntary for those not aiming at exporting Brazilian beef, is perceived as necessary only for international markets requiring traceability, while the domestic market is still considered undemanding.

Actors in the beef production chain perceive it as an ineffective system that, even being coordinated by the government, presents private features, being financed by the cattle farmers themselves.

In 2009 the transparency law was implemented in Brazil (BRASIL, 2009), which allows access to public information, but this law still lacks effectiveness (FGV, 2017). However, data on the slaughterhouses market and inspection information are practically nonexistent. There is a need for a policy that can favor the availability and quality of the information relevant to the parties involved.

In addition, it should be mandatory to prioritize the enforcement capacity and ethics of the Brazilian police and judicial authorities, to inhibit the opportunistic behavior of private and public agents, increasing the efficiency of the beef market and the food markets in general.

It is necessary to have public agents trained and certified not only in their technical knowledge, but also in suitability.

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