

PORT OF SANTOS: SANITARY EDUCATION IN AGRO-DEFENSE

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Abstract: In order to minimize the entry of pathogens in a given country, all animal and plant products have to have an international sanitary certificate that guarantee the sanitary status of the country of origin, as determined by the World Organization for Animal Health. The inspection of the entry and exit of animal and plant products in Brazil are exclusively performed by the International Agricultural and Animal Health Surveillance. Sanitary education is an important tool in agro-defense. The objective of this study was to evaluate the knowledge of passengers of international sea cruises on the entry of pathogens in Brazil via animal and plant products and by-products. Interviews were carried out with sea cruises 354 passengers. Based on the responses, 63.5% of the passengers reported not having previous information on the matter and 29.7% understood that the reason for the prohibition was preventing product spoilage or contamination, not safeguarding agricultural and animal health. It is important to improve sanitary education programs related with agro-defense in the international cruise passenger terminal of the Port of Santos, and to design specific programs for international airports.

Keywords: Agro-defense; Epidemiological surveillance; Globalization; Zoophytosanitary defense.

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PORTO DE SANTOS: EDUCAÇÃO SANITÁRIA NA DEFESA AGROPECUÁRIA

Resumo: Para minimizar o risco da entrada de patógenos no país todos os produtos de origem animal e vegetal têm que ter certificação sanitária internacional para assegurar o status sanitário do país estipulado pela OIE. Medidas de fiscalização da entrada e saída de produtos de origem animal e vegetal, no Brasil, são de competência exclusiva da Vigilância Agropecuária Internacional. A educação sanitária é uma importante ferramenta de defesa agropecuária. O objetivo foi avaliar o nível de conhecimento dos passageiros de cruzeiros marítimos internacionais a respeito da entrada de patógenos, no Brasil, por meio de produtos e subprodutos de origem animal e vegetal. Foram entrevistados 354 viajores de cruzeiros marítimos internacionais. Dos entrevistados, 63,5% referiram não terem tido contato anterior com nenhuma informação e 29,7% entendiam como motivo da proibição a possibilidade do produto estragar ou contaminar e não de comprometer a sanidade agropecuária. Há necessidade da ampliação de programa de educação sanitária em defesa agropecuária no terminal de passageiros de cruzeiros marítimos internacionais do Porto de Santos, estudando ainda, o delineamento de um programa específico para aeroportos que recebam vôos internacionais.

Palavras-chave: Defesa sanitária. Globalização. Vigilância epidemiológica. Zoofitossanitaria.

1. INTRODUCTION

The occurrence of pests, and parasitic and infectious transmissible diseases of animals or plants cause economic losses; have emotional effects due to the loss of cherished animals; cause losses of genetic inheritance by killing of animals for disease control purposes; and generate potential public health problems due to zoonoses.

An example of the potential public health problems caused by zoonoses was the introduction of African Swine Fever in 1978 in a pig raising facility in Paracambi (RJ). In this facility, animals received food leftovers from planes of different airlines, including those from Portugal and Spain, where the disease was endemic at that time. These leftovers were obtained in the Rio de Janeiro International Airport. From this initial focus, 223 other foci were communicated

until the end of 1979, in the north, northeast, center-west, southeast, and south of Brazil. At that moment, 66,966 pigs were killed, causing a loss of 44 million dollars. Brazil was considered free of African Swine Fever only on December 5th, 1984 (TOKARNIA, PEIXOTO, DOBEREINER, BARROS, & CORREA, 2004).

Another example was the introduction of the cotton boll weevil (*Anthonomus grandis* HOHEMAN), which is considered the most important agricultural pest in the USA. Between 1892 and 1999, the US spent US\$ 102 billion were spent in the control of these arthropods and the social and environmental damage generated by it (BARBOSA, 2009). These insects had not been reported in Brazil until February, 1983. The first report was in the Campinas-SP region, in Viracopos Airport, by Braga Sobrinho and Lukefar. Nowadays, the boll weevil is found in almost all Brazilian states where cotton is grown. It is the most important cotton pest in Brazil, given the damage it causes and the difficulty in controlling it (OLIVEIRA, 2011). It is worth to consider the recent introduction of Soybean Rust, one of the most important soybean diseases. It is caused by the fungus *Phakopsora pachyrhizi*, which was detected in Brazil for the first time in 2002 and has a highly destructive potential in several regions of the country (MODELAGEM, 2011). Soybean Rust that came from Paraguay was first reported in Paraná, and generated losses between 30 to 90%, according to the growth stage of the plant. In the 2003/2004 crop, the disease spread to virtually all areas where soybeans were grown in all producer states, and it is one of the main causes of losses in soybean production, reaching 2 billion dollars in expenses, including in the use of fungicides (FURLAN, 2011).

Globalization increased the trade of products and circulation of people between the countries and, consequently, the risk of international exchange of etiological agents that cause diseases in men and animals (HULME, 2009). According to Pimentel et. al. (2005), this is considered the main non-intentional route of invertebrate animals and microscopic organisms. However, people do not even imagine that small, incorrect actions when returning from an international trip, may have this kind of consequence. It is important to emphasize that the imports inspection and certification and the exports of food products comply with guidelines determined to ensure and make it easier for countries to trade food products. These guidelines are a result of bilateral and multilateral agreements between the different countries (FAO/OMS, 2015) that prevent sanctions to the exports of food products. Therefore, to minimize the risk of entry of diseases in

the country, all products of animal origin have to have international sanitary certificates. This measure is essential to ensure the sanitary status of a country, as determined by the World Organization for Animal Health (OIE) (PASTORET & CHAISEMARTIN, 2011). To prevent the dissemination of plant diseases and pests, Brazilian regulations prohibit the entry or exit of plant products without an authorization of the Brazilian Ministry of Agriculture (MAPA) (OLIVEIRA, 2014). Only processed plant products, such as fruit sweets, meals, roasted coffee beans and chocolate may be taken in international trips. It is essential to adopt a set of procedures to improve and protect the health of a given population, and, consequently, its quality of life, preventing the introduction and dissemination of pests and etiological agents of diseases that may pose threats to national agriculture and animal health. These procedures and regulations, in Brazil, are the exclusive responsibility of the Federal Agriculture and Animal Health Inspection of the Ministry of Health in ports, airports, and borders by means of the International Agricultural and Animal Health Surveillance – VIGIAGRO. In the international sea cruise sector, VIGIAGRO uses X-ray scanners and physical inspection for accompanied and unaccompanied baggage, according to Brazil (2006). To prevent the introduction of these pathogens, the VIGIAGRO tasks in international airports, ports, border inspection posts, and special custom posts are intensified in the school vacation periods due to the increased number of international travels (STUMM, 2012). All products of plant or animal origin that do not have zoophytosanitary certification are apprehended and destroyed (BRAZIL, 1998).

However, the population is not always updated on technical information. Sometimes, when travelling and returning to Brazil, people bring products of animal origin, such as cheese, sausages, cured or raw meats, and of plant origin, such as fruits, that may be vehicles for new pathogens if they do not have a zoophytosanitary certification from their origin.

According to the “Top 50 world container ports”, the port of Santos ranks 38th in the worldwide movement of containers (TOP, 2015), and it is the most important complex in container movement in Latin America (SANTOS, 2016). In the period that this study was carried out 999,850 passengers circulated in the arrival and departure terminals of this port (MOVIMENTAÇÃO, 2015).

Because of this, the Brazilian Ministry of Agriculture established the National Program of Sanitary Education in Agro-Defense, by means of Normative

Instruction no. 28 /2008, in order to promote, with sanitary education in agro-defense activity and actions, the sanitary status, innocuousness, and quality of Brazilian agricultural and animal products and by-products (BRAZIL, 2008).

Sanitary education may be defined as a set of educational methods that leads to the construction, deconstruction, and reconstruction of knowledge and causes cognitive, affective and psychomotor changes in a population facing a sanitary problem perceived in agricultural and animal health (IMPROTA, 2012-verbal report). Therefore, it is understood that sanitary education actions may collaborate with the eradication of erroneous practices and increase the awareness of the Brazilian population in maintaining the current zoophytosanitary status. Therefore, the objectives of this Sanitary Education program were to: evaluate the level of knowledge of passenger of international sea cruises in the Port of Santos in relation to the entry of pathogens in Brazil in plant and animal products and by-products; to make restrictions clear to these passengers; and, by means of a scientific article, to promote a wide discussion on a theme that is normally restricted to competent authorities.

2. MATERIAL AND METHODS

In the departure area of the Concais passenger terminal in the Port of Santos, from January to March 2012, 354 passengers of international sea cruises answered a questionnaire with the following questions: "(1) Have you ever been informed on animal and plant products that are prohibited entry in Brazil? If yes, which was the source of the information?; (2) Do you know which animal and plant products are prohibited entry in Brazil?; (3) Mark the animal and plant products that are prohibited entry in Brazil.; (4) Do you know the reason why these products are prohibited entry and the importance of this prohibition? Can you list some reasons?". The passenger answered the questions and the interviewer marked the answers on the form. After that, the rules for the entry of animal and plant products and by-products were presented and explained individually to each passenger based on a printed material of the Brazilian Ministry of Agriculture.

Descriptive statistical analysis was carried out by means of tables based on the answers to the questionnaire. Inferential statistics were conducted in order to find an association between the source of information and the knowledge on the

prohibition of animal and plant origin (or both), and the reasons for the prohibitions, using Pearson's chi-square test at a 0.05 significance level in SPSS v.9. The criterion adopted to determine knowledge on the prohibition of animal products was correctly pointing out at least 5 of the 6 products cited. For the plant products, knowledge was considered when at least 2 of the 3 products were pointed out.

3. RESULTS

When asked about contact with information on the prohibited entry of animal and plant products in Brazil, from the 354 interviewees, 225 (63.5%) reported lack of previous contact with this kind of information; 54 (15.2%) received information on international flights, and 78 (22.0%) were informed by folders, pamphlets, manuals, and other written materials. There was a significant difference between the source of information and the knowledge on prohibited entry of animal, plant, and both products ($p < 0.001$). For animal products, 17.6% (13/74) received information by different materials, such as pamphlets and folders, and 8.1% (6/74) in previous international flights. As for those who knew the prohibition on plant products, 33.3% (4/12) reported having been informed by different materials, whereas 8.3% (1/12) were informed in international flights. It is important to emphasize that 42% of the interviewees did not know about the prohibited entry of animal and plant products, and previous contact with the information did not help passengers to know which products were prohibited entry (Table 1). Tables 2 and 3 present information on the list of prohibited entry animal and vegetable products of Question 3 of the questionnaire. When asked on the reasons for the prohibition, only 73 (20.45%) of the 357 interviewees referred to the spread of pathogens to plants, animals, men, and the environment. From the total of passengers, 106 (29.7%) understood the prohibition as possible spoilage or contamination of the product, as shown in Table 4.

Table 1. Previous contact with information on prohibitions and knowledge on the illegal products.

Type of information	Knowledge				P value
	Animal	Plant	Both	Both unknown	
Not informed	55 (74.3%)	7 (58.3%)	52 (44%)	111 (74%)	<0.001
International flight	6 (8.1%)	1 (8.3%)	33 (28%)	13 (8.7%)	
Pamphlet and/or other material	13 (17.6%)	4 (33.3%)	33 (28%)	26 (17.3%)	
Total	74 (100%)	12 (100%)	118 (100%)	150 (100%)	

Table 2. Knowledge on prohibited entry animal and plant products in Brazil.

Answers	Frequency	
	Did not know about prohibition	Knew about prohibition
Cheeses	141 (39.8%)	213 (60.2%)
Soybeans	215 (60.7%)	139 (39.3%)
Sausages	171 (48.3%)	183 (51.7%)
Cured meats	140 (39.5%)	214 (60.5%)
Raw beans	211 (59.6%)	143 (40.4%)
Raw meat	110 (31.1%)	244 (68.9%)
Dairy products	161 (45.5%)	193 (54.5%)
Ham	147 (41.5%)	207 (58.5%)
Oranges	182 (51.4%)	172 (48.6%)

Table 3. Knowledge on animal and plant products that are not prohibited entry in Brazil.

Answers	Frequency	
	Did not know about prohibition	Knew about prohibition
Canned products	89 (25.1%)	265 (74.9%)
Cookies and crackers	44 (12.4%)	310 (87.6%)
Chocolates	15 (4.2%)	339 (95.8%)

Table 4. Reasons for prohibited entry of plant and animal products in Brazil, according to the type of previous information.

Type of information	Reason for the prohibition			P value
	Does not know	Spoilage/contamination	Source of pathogens for agriculture, animals, men or environment	
Not informed	129 (57.3%)	62 (27.6%)	34 (15.1%)	0.001
International flight	17 (32.1%)	20 (37.7%)	16 (30.2%)	
Pamphlets and/or other materials	29 (38.2%)	24 (31.6%)	23 (30.2%)	
Total	175 (100%)	106 (100%)	73 (100%)	

4. DISCUSSION

The economic growth in Brazil and all over the world enabled people to use a larger share of their income in leisure activities, such as international and national sea cruises. However, improved income used in international sea cruises did not come together with the knowledge on the consequences of bringing products such as cheeses, salami, cured meats, fruits, and seeds from international trips. Most of the passengers (63.5%) from the 2011/2012 season did not know the consequences of the entry of these products in Brazil. This lack of knowledge may have been the cause of the introduction of the cotton boll weevil, as reported by Braga Sobrinho and Lukefar, which first occurred in the region of Campinas-SP (OLIVEIRA, 2011), probably via the Viracopos airport. In general, products such as cheeses, cured and raw meats, and sausages were those that the interviewees correctly pointed out as prohibited entry in Brazil without a zoophytosanitary certificate.

This occurrence may be due to the fact that these are the most attractive products for the international traveler. But the knowledge on the prohibition does not ensure that these people do not bring them in their baggage when they travel, as they do not have technical knowledge on the transmission of the

disease. According to Melo and cols. (2014), it is important to know the profile of the offending passenger. Lack of knowledge on the real reason of the prohibition may be the motivation for the offense, as only 73 (20%) of the interviewees reported the possibility that the product may work as a source of pathogens for plants, men, animals and the environment.

When passengers had previous knowledge on the issue, it was observed information was most commonly received in a folder, pamphlet or manual than in international flights. However, having received previous information did not help the passengers in answering correctly the prohibited entry products. The proportion of right answers was greater in passengers that reported not having received previous information. These individuals may have given the right answers because they may have related the prohibition with the perishable nature of the product.

Another issue that repeatedly appeared in the comments of the interviewees was the confusion between official regulations and the rules imposed by sea cruise companies, which do not allow passengers to bring food and water in the ship, and with the expense limit in dollars determined by the Internal Revenue Service. This fact corroborates the need for an efficient zoophytosanitary education program that is wide-ranging and continuous, as a large percentage of the interviewees did not know the prohibition to the entry of animal and plant products and the reasons for these prohibitions. Even those who were informed once on the matter, did not know the prohibited entry products. It is important to emphasize that only the distribution of educational materials, such as pamphlets, banners, and other products, do not make up an educational process, which is much broader than this. Cleary (1988) states that information, although helpful in the learning process, is not the whole process. Oliveira et al. (2016) trained food handlers, and identified the difficulty of changing daily practices only by providing information.

Although it was not object of this study, part of the population is not able to relate the entry of a piece of cheese or salami in the country with the occurrence of an animal disease. It should be clarified that if the salami or cheese come from a production animal that carry a pathogen in their country of origin, even if this pathogen does not cause a zoonosis, the food product may be discarded with the domestic garbage and may arrive in informal landfills, where pigs, cattle and goats of small animal producers may be fed. As most Brazilian cities do not

have official landfills, and these food wastes may be fed to domestic animals, the pathogen from abroad will be able to reach Brazilian animals.

To the best of our knowledge, no references were found to compare the knowledge of sea cruise travelers on the entry of animal and plant products without zoophytosanitary certificates in other Brazilian ports or international flights. As sanitary education is an active and continuous process, the results obtained here may serve as a base for new educational actions.

5. CONCLUSION

It is important to improve the sanitary education program in agro-defense in the international sea cruise terminal of the Port of Santos, and to consider designing specific programs for international airports.

REFERENCES

BARBOSA, S. O bicudo do algodoeiro no Brasil: análise de diferentes cenários. In CONGRESSO BRASILEIRO DO ALGODÃO: SUSTENTABILIDADE DA COTONICULTURA BRASILEIRA E EXPANSÃO DOS MERCADOS, 7., 2009, Foz do Iguaçu, PR. **Anais...** Campina Grande, PB: EMBRAPA Algodão, 2009. 1 CD ROM.

BRASIL. **Instrução Normativa MAPA nº 28, de 15 de maio de 2008.** Institui o Programa Nacional de Educação Sanitária em Defesa Agropecuária e dá outras providências. Diário Oficial da União, Brasília, DF, 16 mai. 2008. Seção 1. p. 1.

BRASIL. **Portaria nº 297, de 22 de junho de 1998.** Cria o Programa de Vigilância Agropecuária Internacional no Âmbito de atuação da Secretaria de Defesa Agropecuária, MAPA. Diário Oficial da União, Brasília, DF, 23 jun, 2008.

BRASIL. **Instrução Normativa MAPA nº 36, de 10 de novembro de 2006.** Aprova o Manual de Procedimentos Operacionais da Vigilância Agropecuária Internacional e dá outras providências. Diário Oficial da União, Brasília, DF, 14 nov. 2006. Seção 1. p. 3.

CLEARY, H. P. Health education: the role and functions of the specialist and generalist. **Revista de Saúde Pública**, n. 22, v. 1, p. 64-72, 1988. Retrieved from: <<http://dx.doi.org/10.1590/S0034-89101988000100009>>. Access: 3 ago. 2016. doi: 10.1590/S0034-89101988000100009.

FAO/OMS. **Codex Alimentarius – Procedural manual**. 23^a Ed, Roma, 2015. 228p. Retrieved from <http://ftp.fao.org/codex/Publications/ProcManuals/Manual_23e.pdf>. Access: 16 set. 2015.

FURLAN, S. H. **Impacto, diagnose e manejo da ferrugem asiática da soja no Brasil**, 2011. Retrieved from <http://www.biologico.sp.gov.br/rifib/XI_RIFIB/furlan.PDF>. **Access: 16 set. 2015.**

HULME, P. E. Trade, transport and trouble: managing invasive species pathways in an era of globalization. **Journal of Applied Ecology**, 46, 10-18, 2009. Retrieved from: <<http://dx.doi:10.1111/j.1365-2664.2008.01600>>. Access: 16 set. 2015. doi: 10.1111/j.1365-2664.2008.01600.

IMPROTA, C. T. R. A educação sanitária e as bases do sanitário. In COLÉGIO NACIONAL DE EDUCAÇÃO SANITÁRIA E COMUNICAÇÃO PARA A SAÚDE, 3., 2012, Salvador, BA, 2012.

MELO, C. B. et al. Profile of international air passengers intercepted with illegal animal products in baggage at Guarulhos and Galeão airports in Brazil. **Springer Plus**, v. 3, n. 69, p. 3-8, 2014. Retrieved from: <<http://springerplus.com/content/3/1/69>>. Access: 16 set. 2015.

doi: 10.1186/2193-1801-3-69.

MODELAGEM, **avaliação e previsão de risco sazonal da ferrugem da soja no Brasil. (2011). Retrieved from <http://www6.ufrgs.br/agronomia/fitossan/epidemiologia/pesquisa/ferrugem-modelagem>.**

MOVIMENTAÇÃO de passageiros. Access: 10 dez. 2015. Retrieved from: <http://www.concais.com/pt-br/estatisticas>.

OLIVEIRA, C. **Governo orienta para embarque de produtos agropecuários**. Access: 15 set. 2015. Retrieved from

<http://www.agricultura.gov.br/animal/noticias/2014/01/governo-orienta-para-embarque-de-produtos-agropecuarios>.

OLIVEIRA, C. A. F. et al. Food safety: Good Manufacturing Practices (GMP), Sanitation Standard Operating Procedures (SSOP), Hazard Analysis and Critical Control Point (HACCP). In: BARROS-VELASQUEZ, J. **Antimicrobial food packaging**. San Diego: Elsevier, 2016. Cap. 10, p. 129-139.

OLIVEIRA, M. C. (2011). **Programa de Prevenção e Controle de Pragas em Algodão**. Access: 15 set. 2015. Online. Retrieved from http://www.agrodefesa.gov.br/index.php?option=com_content&view=article&id=74.

PASTORET, P. P.; CHAISEMARTIN, D. The importance of governance and reliable veterinary certification. Revue Scientifique et Technique de L'office International des Epizooties, v. 30, n. 1, p. 347-352, 2011.

PIMENTEL, D. et al. Update on the environmental and economic costs associated with alien-invasive species in the United States. **Ecological Economics**, v. 52, p.273-288, 2005.

SANTOS se mantem como principal porto de contêineres da America Latina. Access: 2 abr. 2016. Retrieved from <http://www.portodesantos.com.br/pressRelease.php?idRelease=873>>.

STUMM, V. **Transporte de alimentos entre os países tem restrições**. Access: 7 dez. 2012. Retrieved from: <<http://www.agricultura.gov.br/animal/noticias/2012/12/transporte-de-alimentos-entre-os-paises-tem-restricoes>>.

TOKARNIA, C. H. et al. O surto de peste suína africana ocorrido em 1978 no município de Paracambi, Rio de Janeiro. **Pesquisa Veterinária Brasileira**, v. 24, n. 4, p. 223-238, 2004.

TOP of world container ports. Access: 2 abr. 2016. Retrieved from <http://www.worldshipping.org/about-the-industry/global-trade/top-50-world-container-ports>.

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