

# Non-compliance of sanitary standards in the offer of animal products in e-commerce and the risks to public health

## Descumprimento de normas sanitárias na oferta de produtos de origem animal em e-commerce e os riscos para a saúde pública

### ABSTRACT

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**Introduction:** The marketing of products of animal origin (POAO) in marketplace without prior inspection surveillance exposes consumers to products that may present problems of authenticity, inadequate labeling, fraud or non-conformities of hygienic-sanitary or technological order disrespecting consumer rights, in addition to the possibility of causing harm to public health. **Objective:** To identify and trace the profile of the products offered via e-commerce and verify compliance with the standards of food health regulation and consumer protection and defense in Brazil. **Method:** POAO sales ads were tracked, enumerated and tabulated qualitatively in the categories: product type; official stamp of the Sanitary Inspection and origin - regional division of the country. Then, the tabulated data were analyzed and submitted to descriptive statistics and chi-square test ( $\chi^2$ ). **Results:** A total of 498 POAO were offered, of which there was a predominance of those who did not have the official stamp of surveillance and sanitary inspection. The meat products represented most of the products sold, while in the origin category, the Southeast region presented the highest frequency of ads. **Conclusions:** The results obtained demonstrated the non-compliance with the health legislation. Several categories of POAOs were identified and were deliberately offered in breach of hygienic and sanitary legislation for the production and marketing of food products.

**KEYWORDS:** Meat; Dairy; Fish; E-commerce

### RESUMO

**Introdução:** A comercialização de produtos de origem animal (POA) em *marketplace* sem a prévia inspeção e fiscalização expõe os consumidores a produtos que podem apresentar problemas de autenticidade, rotulagens inadequadas, fraudes ou não conformidades de ordem higiênico-sanitária ou tecnológica, desrespeitando os direitos do consumidor, além da possibilidade de causar danos à saúde pública. **Objetivo:** Identificar e traçar o perfil dos produtos ofertados via *e-commerce* e verificar o cumprimento às normas de regulação sanitária de alimentos e de proteção e defesa do consumidor no Brasil. **Método:** Anúncios de venda de POA foram rastreados, enumerados e tabulados de forma qualitativa nas categorias: tipo de produto; carimbo oficial da Inspeção Sanitária e origem - divisão regional do país. Em seguida, os dados tabulados foram analisados e submetidos à estatística descritiva e teste de qui-quadrado ( $\chi^2$ ). **Resultados:** Foram identificados 498 POA sendo ofertados, e houve a predominância daqueles que não apresentavam o carimbo oficial de inspeção e fiscalização sanitária. Os produtos cárneos representaram a maioria dos produtos comercializados e, na categoria origem, a região Sudeste apresentou a maior frequência de anúncios. Os resultados obtidos demonstraram o descumprimento à legislação sanitária. **Conclusões:** Foram identificadas diversas categorias de POA sendo ofertados de forma deliberada em descumprimento à legislação higiênico-sanitária para a produção e comercialização de produtos alimentícios.

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## INTRODUCTION

The introduction of digital technologies in the commercial area has been promoting changes in the economic scenario<sup>1</sup>. The speed and ease of using the internet, combined with comfort and convenience for consumers, have made *e-commerce* increasingly popular<sup>2,3</sup>. In Brazil, this form of commercialization had, in 2018, estimated revenue of R\$ 53.4 billion, an increase of 12% compared to the previous year<sup>4</sup>. To meet the changes in the population's consumption mode, the food retail market has been gradually remodeling in recent decades, initially moving from sales in traditional physical stores to large supermarkets, and from these to digital commerce, thus achieving cost reduction and greater participation in sales<sup>5</sup>. With the expansion of this type of trade, there was a consequent increase in the diversity of markets and goods available, which include products of animal origin (POA).

This sales channel also presents itself as an alternative for the outflow of small producers by circumventing commercial barriers such as the distance from production sites to consumer centers<sup>6</sup>. However, ensuring the quality and authenticity of products can be questionable, creating considerable challenges to food control<sup>3,7</sup>.

Authenticity problems, inadequate labeling, fraud, and the origin of products can also generate significant deleterious impacts on the world economy<sup>8</sup>. POA can be contaminated during the production chain due to non-conformities of a hygienic-sanitary or technological order, being sufficient for the occurrence of public health events. Diseases resulting from the consumption of these products are increasing their incidence, constituting a global public health problem and arousing, considerably, the interest of the population in relation to food safety<sup>9,10</sup>. According to the World Health Organization (WHO) every year up to 600 million people in the world fall ill after ingesting contaminated food, of which 420,000 die. The African region and subsequently Southeast Asia, Western Pacific, Eastern Mediterranean, European region and the Americas region had a fatality rate of 0.15%, 0.12%, 0.04%, 0.04%, 0.02%, and 0.01%, respectively<sup>11</sup>. In Brazil, 6,803 cases were reported, with nine deaths, with a mortality rate of 0.13%<sup>12</sup>. The differences observed are related to populations living in low-income regions and children under five years of age<sup>11,12</sup>.

No industrial establishment or POA warehouse can operate without registration with the inspection agency or ship products without labels, as these contain, among others, information from the industrial and sanitary inspection service<sup>13</sup>. It is the responsibility of the Ministry of Agriculture, Livestock and Food Supply (MAPA), to inspect those who carry out interstate or international trade, the Departments of Agriculture of the States and the Federal District, those establishments that carry out trade in an intermunicipal scope, the Secretariats or Departments of Agriculture of the Municipalities of establishments that do only municipal commerce and the Health Surveillance of the states, the Federal District and municipalities, wholesalers and retail establishments<sup>14,15,16</sup>. However, despite having laws that ensure

the regulation of production and consumption of these products, Brazilian electronic commerce lacks specific regulations. The development of food control systems with a focus on consumer protection is one of the current challenges for official consumer protection and defense agencies, such as the Consumer Protection and Defense agency (PROCON) and the Health Inspection agencies<sup>17</sup>. The recognition of consumer vulnerability to commercial practices is provided for in the National Policy on Consumer Relations, as a way to guarantee the fundamental rights provided for in the Federal Constitution<sup>18,19</sup>.

Considering the increase in the consumer electronics market and the possibility of offering POA in *marketplaces*, this study aimed to identify and profile the products offered via *e-commerce* and verify compliance with food health regulation and consumer protection and defense rules in Brazil.

## METHOD

During the period from July to August 2018, a descriptive study<sup>20</sup> was conducted in order to identify and profile the commercialization of POA through *e-commerce* in Brazil. The website of a *marketplace*, was selected, established among the leaders in the *ranking* of *e-commerce* in the country and that presented a wide variety and availability of products advertised for sale. Using the *site's* own search tool, the following words were used: meat, deli meats, sausage, salami, hot dog, mortadella, milk, cheese, fish, and egg to track advertisements that promoted the sale of such products or those related thereto.

The advertisements found were enumerated and tabulated in a qualitative way, considering the following categories: **type of product** - meat, dairy, fish and egg; figurative identification of the **official stamp of the Sanitary Inspection**<sup>13</sup> - identification on the label, referring to the previous inspection and sanitary and industrial inspection - Federal Inspection Service (SIF), State Inspection Service (SIE) or Municipal Inspection Service (SIM)<sup>13,15,16</sup>; and **origin** - regional division of the country<sup>21</sup>. All data were tabulated in Microsoft Excel, analyzed and submitted to descriptive statistics and the chi-square test ( $\chi^2$ ) with a significance level of 5% depending on the categories previously defined in the Bioestat 5.0 program<sup>22</sup>.

## RESULTS

A total of 498 POA advertised for sale through *e-commerce*, were identified, of which the highest frequency ( $p \leq 0.05$ ) was meat products (80.7%;  $n = 402$ ), followed by dairy (13.5%;  $n = 67$ ), fish (5.2%;  $n = 26$ ) and egg (0.6%;  $n = 3$ ), respectively (Table 1). As for the lack of information about the seal of the official sanitary inspection service on the labeling, there was no difference ( $p > 0.05$ ) between the types of products offered.

Contrary to current legislation, in 87.8% ( $n = 437$ ) of the POA, no reference to the mandatory information of the official sanitary



inspection identification seal (stamp) referring to the previous performance of the official sanitary inspection was found on the label or advertisement in industrial establishments (Table 2). On the other hand, in the products with approval, the SIF information was observed in 5.8% (n = 29); of SIM, in 5.6% (n = 28); and of SIE, in 0.8% (n = 4).

The offer of POA through *e-commerce* was more frequent ( $p \leq 0.05$ ) in the Southeast region, with 88.2% (n = 439), followed by the South region, with 6.8% (n = 34), Northeast, with 3.2% (n = 16) and Midwest, with 1.8% (n = 9), respectively, and no product offered in the North region was found (Table 3). There was no difference ( $p > 0.05$ ) regarding the information on the labeling of the seal of official sanitary inspection services between the regions. In the Southeast region, 86.9% of the products did not have the official sanitary inspection seal on the label and, in the Northeast and Midwest regions, none of the products evaluated had such identification.

In all regions of Brazil evaluated, meat products were the ones with the highest frequency regarding the absence of information on the label referring to the seal of the official sanitary inspection service. However, the South region was the only one that showed a statistical difference ( $p \leq 0.05$ ), with 85.3% (n = 29) of meat products regarding the absence of such information, when compared to the others (Table 4).

## DISCUSSION

The occurrence of ads with different types of POA for marketing through *e-commerce* was observed in the studied *marketplace*. Due to the impossibility of contact with the products, electronic marketing limits the consumer to the thorough evaluation of some important aspects, such as: storage, hygiene, sensory characteristics, identity and quality parameters, as well as, sometimes, labels, which infringe legal aspects of marketing. Given these situations, it was possible to perceive a favorable environment for the offer of products with the potential to cause public health events, as no legal provision was identified in the studied *marketplace* that disciplined or regulated, under the hygienic-sanitary aspect. The registration or offer of such products leaves the consumer at the mercy of the free market, subjecting them to conditions of inequality in the consumption relationship. Therefore, the principles of the National Consumer Relations Policy must be complied with, and it is necessary to recognize the vulnerability of the consumer in the consumer market, as provided for in the Consumer Defense Code and the Federal Constitution. Health is a fundamental right, guaranteed through social and economic policies aimed at reducing the risk of disease and other health problems<sup>19</sup>. In Brazil, industrial and sanitary inspection of POA are regulated by specific regulation that authorizes exposure for sale or distribution only of products that: do not represent a risk to public health; have not been tampered with, defrauded, or falsified; and has ensured traceability in the reception, manufacturing, and dispatch phases<sup>16</sup>.

**Table 1.** Frequency of animal products advertised for sale through *e-commerce* in Brazil categorized by type of product and the existence of the official seal of the sanitary inspection (stamp), in the period from July to August 2018.

Type of product	N	Frequency (%)	Stamp (%)	
			Present	Absent
Meat	402	80.7 <sup>a</sup>	12.9 <sup>a</sup> (n = 52)	87.1 <sup>a</sup> (n = 350)
Milk	67	13.5 <sup>b</sup>	10.4 <sup>a</sup> (n = 7)	89.6 <sup>a</sup> (n = 60)
Fish	26	5.2 <sup>c</sup>	3.8 <sup>a</sup> (n = 1)	96.2 <sup>a</sup> (n = 25)
Egg	3	0.6 <sup>d</sup>	33.3 <sup>a</sup> (n = 1)	66.7 <sup>a</sup> (n = 2)
<b>Total</b>	<b>498</b>	<b>100.0</b>	<b>12.2<sup>b</sup></b> (n = 61)	<b>87.8<sup>a</sup></b> (n = 437)
<b>Value of <math>\chi^2</math></b>		<b>841.58</b>	<b>3.32</b>	

Source: Elaborated by the authors, 2020.

N: number of products sold.

Frequency values, in the columns, with statistical differences by the chi-square ( $\chi^2$ ) test with a significance level of 5%, are indicated by different lowercase letters and on the line, are indicated by uppercase letters.

**Table 2.** Frequency of animal products advertised for sale through *e-commerce* in Brazil categorized by the existence of the official seal of the sanitary inspection (stamp), in the period from July to August 2018.

Stamp	N	Frequency (%)	Value of $\chi^2$
Present on the label	61	12.2 <sup>b</sup>	775.07
Absent on the label	437	87.8 <sup>a</sup>	
Inspection competence			
SIF	9	5.8 <sup>b</sup>	1,049.07
SIE	4	0.8 <sup>c</sup>	
SIM	8	5.6 <sup>b</sup>	
Absent	437	87.8 <sup>a</sup>	
<b>Total</b>	<b>98</b>	<b>100.0</b>	

Source: Elaborated by the authors, 2020.

SIF: Federal Inspection Service; SIE: State Inspection Service; SIM: Municipal Inspection Service; N: number of products sold.

Frequency values, in the columns, with statistical differences by the chi-square ( $\chi^2$ ) test with a significance level of 5%, are indicated by different lowercase letters.

**Table 3.** Frequency of animal products advertised for sale through *e-commerce* in Brazil, regarding the regional division of the country and the existence of the official seal of sanitary inspection (stamp), in the period of July to August 2018.

Regional division	N	Frequency (%)	Sanitary inspection official stamp (%)	
			Present	Absent
Midwest	9	1.8 <sup>c</sup>	0.0 <sup>a</sup>	100.0 (n = 9)
Northeast	16	3.2 <sup>c</sup>	0.0 <sup>a</sup>	100.0 (n = 16)
Southeast	439	88.2 <sup>a</sup>	13.1 <sup>a</sup> (n = 58)	86.9 <sup>a</sup> (n = 381)
South	34	6.8 <sup>b</sup>	9.4 <sup>a</sup> (n = 3)	90.6 <sup>a</sup> (n = 31)
<b>Total</b>	<b>498</b>	<b>100.0</b>	<b>12.2<sup>b</sup></b> (n = 61)	<b>87.8<sup>a</sup></b> (n = 437)
<b>Value of <math>\chi^2</math></b>		<b>410.25</b>	<b>4.24</b>	

Source: Elaborated by the authors, 2020.

N: number of products sold; \*NA: Statistical analysis does not apply.

Frequency values, in the columns, with statistical differences by the chi-square ( $\chi^2$ ) test with a significance level of 5%, are indicated by different lowercase letters and on the line, are indicated by capital letters.

**Table 4.** Frequency of official sanitary inspection seal (stamp) on products for sale through *e-commerce* in each of the regions of Brazil, from July to August 2018.

Regional division	Stamp	Type of product (%)				Total (%)	Value of $\chi^2$
		Meat	Milk	Fish	Egg		
Southeast	Absent	69.0 <sup>a</sup> (n = 303)	13.0 <sup>a</sup> (n = 57)	4.6 <sup>a</sup> (n = 20)	0.2 <sup>a</sup> (n = 1)	100.0 (n = 439)	2.03
	Present	11.4 (n = 50)	1.6 (n = 7)	0.2 (n = 1)	0.0		
South	Absent	85.3 <sup>a</sup> (n = 29)	2.9 <sup>b</sup> (n = 1)	0.0	2.9 <sup>b</sup> (n = 1)	100.0 (n = 34)	4.53
	Present	6.0 (n = 2)	0.0	0.0	2.9 (n = 1)		
Midwest	Absent	88.9 (n = 8)	11.1 (n = 1)	0.0	0.0	100.0 (n = 9)	*NA
Northeast	Absent	62.5 (n = 10)	6.3 (n = 1)	31.3 (n = 5)	0.0	100.0 (n = 16)	*NA
<b>Total</b>		80.7 <sup>a</sup> (n = 402)	13.5 <sup>b</sup> (n = 67)	5.2 <sup>c</sup> (n = 26)	0.6 <sup>d</sup> (n = 3)	100.0 (n = 498)	841.58

Source: Elaborated by the authors, 2020.

N: number of products sold; \*NA: Statistical analysis does not apply.

Frequency values, in the lines, with statistical differences by the chi-square ( $\chi^2$ ) test with a significance level of 5%, are indicated by different lowercase letters.

With regard to consumer relations, the Consumer Defense Code provides as a basic consumer right to adequate and clear information about the different products and services, with correct specification of quantity, characteristics, composition, quality and price, as well as the risks they present to health and safety<sup>18</sup>. The Civil Rights Framework for the Internet also established that the rights and guarantees of network users are the application of consumer protection and defense rules in consumer relations carried out on the internet, and the National Consumer Secretariat is responsible for inspecting and investigating these types of infractions<sup>23,24</sup>.

Of the 498 POA identified, the highest frequency was meat products (80.7%), presumably due to the greater variety of meat from butchers and possibilities of elaboration of derivatives, followed by dairy products (13.5%). Milk and meat are basic elements of the Brazilian diet, however, they can represent a potential means of contaminants of a biological, physical, or chemical nature from production, processing, storage, transport, and marketing conditions<sup>25</sup>. According to Rocha et al.<sup>26</sup>, the consumption of these products without prior inspection exposes the population to a high number of zoonoses such as tuberculosis, salmonellosis, brucellosis, and listeriosis. The stamps of the sanitary inspection services, required as mandatory information on POA labels, refer to the registration by which the producing establishment is subordinate to the executing agency of the inspection. However, the absence of this identification figured on the labels occurred more frequently (87.8%) in all regions, and meat products offered in the South region were those with the greatest lack of information. Considering that *e-commerce* makes it possible to offer products nationwide, there would be a need for the SIF seal for commercialization.

Establishments, in order to carry out interstate or international trade in POA, must be registered with the Department of Inspection of Products of Animal Origin or listed with the POA inspection service in the federation unit<sup>16</sup>. Also according to the Technical Regulation for Labeling of Packaged Animal Products,

the official stamp of the Federal Inspection is mandatory on the labels of these products<sup>13</sup>. According to Freitas et al.<sup>27</sup>, all products must display on their label a single stamp of the Official Inspection Service in which they were registered, thus enabling the identification that they come from inspected establishments and that they are healthy, safe and reliable for sale to the consumer. The lack of the Official Inspection Service stamp on the labels of the products presented in the advertisements characterizes the negligence and unimpressive knowledge of the need for such data to guarantee compliance with consumer rights and the requirements of safety, identity, quality and compliance with legislation and norms that regulate the production, elaboration, commercialization, and consumption of foods of animal origin<sup>13</sup>.

The wide range of products being deliberately offered and sold, openly violating health legislation and consumer rights, especially regarding public health, brings an alert to potential dangers that the population may be exposed to when consuming such foods. In only 29 (5.8%) of all the products evaluated, information from the registration in the official federal health inspection body was identified on the labeling, which ratifies the possibility of interstate commerce and characterizes the product as to the appropriate marketing scope for this mode of trade. However, this frequency did not differ ( $p > 0.05$ ) among products registered with the Municipal Inspection Service, whose sale is only allowed within the municipality itself. This supposedly occurred due to the small-scale producer seeing in *e-commerce* a possibility of expanding the market and, consequently, sales, identifying in this means of dissemination and commerce greater ease of access to consumers, cost reduction when compared to physical stores, ease of delivery, and reduction or even absence of bureaucracy, controls, and inspection<sup>6</sup>.

Regarding the regional division of the country, the highest frequency of POA advertisements came from the Southeast region and may be related to the high demographic density presented in this region<sup>28</sup>. Products prepared and/or marketed in



disagreement with the health legislation in force in the country refer to clandestinity, configuring a sanitary infraction when characterized as the act of producing, manufacturing, packaging or repacking, storing, shipping, transporting, buying, selling, giving or using food or food products, without registration, license and authorizations from the competent sanitary agency or contrary to the relevant legal norms<sup>14</sup>.

The development of food control systems with a focus on consumer protection is one of the current challenges for the authorities<sup>17</sup>, it is up to them to define the degree of responsibility arising from the electronic marketing of POA, the person responsible for selling the product or the *e-commerce website*, therefore recognizing the *e-commerce* as an additional sales channel and an integral part of government control<sup>29</sup>.

## CONCLUSIONS

The deliberate offer and sale by *e-commerce*, of various POA, could be observed in Brazil, with greater evidence for meat products and with a greater concentration of offers in the Southeast region. Evidence of offenses were observed, both from the health aspect and from the consumer's rights. The inexistence, on the label, of the indication of the seal of the official inspection and sanitary inspection services presupposes the previous non-performance of mandatory procedures from the industrial and sanitary point of view. There is an imminent need for rules to discipline and regulate the offer of these products on the *websites* of companies with their own virtual stores, *marketplaces* as well as the inspection of food sold on the internet, since this presents itself as a possibility of sales with wide reach and in expansion.

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#### Author's Contributions

Silva IST - Conception and planning (study design), acquisition, analysis and data interpretation. Sousa MRP - Conception and planning (study design), acquisition, analysis, data interpretation, and writing of the work. Santos TM - Data acquisition, analysis, and interpretation. Fernandes TA, Matias CAR - Writing of the work. All authors approved the final version of the work.

#### Conflict of Interests

The authors inform that there is no potential conflict of interest with peers and institutions, politicians, or financial in this study.



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