Safety criteria for the acquisition of meat in Brazilian University restaurants

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Abstract

The present study's objective was to analyze the procedures aimed at guaranteeing sanitary conditions when acquiring meat. The study was conducted with university restaurants of the Federal Institutions of Higher Education (IFES) located in the five regions of Brazil. Data were collected using a questionnaire and an evaluation list, which was available online to restaurant professionals. The results showed that restaurants chose one or two types of meat, the most frequent of which were beef and chicken. In restaurants managed by the IFES, the acquisition of raw material occurred by bidding. For vendor selection, the restaurants required product registration with the Inspection Service and requested regulation of the supplier by the Health Surveillance. Monitoring was carried out through a technical visit to the supplier and a review of the past records of the supplier. A higher percentage of restaurants in the Southeast region met appropriate sanitary and hygienic criteria for the receipt of meat, followed by the South, Midwest, Northeast and North. We conclude that restaurants meet most of the safety criteria set in the legislation. However, some weaknesses are evident in the physical and functional structure, the system of transportation of raw material and the records of control measures at the place of reception.

Keywords: food quality; food services; food safety.

1 Introduction

The Brazilian population has undergone major social transformation in recent decades, resulting in changes in physical spaces for sharing meals and daily practices of food preparation (Brasil, 2008b). Among some facilities where meals are consumed outside the home, university campus restaurants of the Federal Institutions for Higher Education (IFES) have the responsibility to ensure right to adequate safety of food (Brasil, 2008a).

The sanitary quality of products offered by food services is an important issue for the individual and population health because many food poisoning outbreaks occur when food is prepared for large groups (Codex Alimentarius Comission, 1993). In Brazil, restaurants rank second in number of reported foodborne illness outbreaks. An epidemiological analysis of 8451 outbreaks of foodborne illnesses reported by the Ministry of Health between 2000 and 2011 revealed that foods of animal origin were the most commonly involved foods in the outbreaks (Brasil, 2011).

Foodborne illnesses associated with food services are related to the hygienic-sanitary quality of food premises (World Health Organization, 2009). Studies conducted in institutional and commercial restaurants in Brazil and other countries show that food services do not always comply with regulations concerning sanitary conditions. This non-compliance includes violations of basic aspects of current legislation, such as inadequate physical infrastructure, lack of management control and monitoring, and restricted capabilities (Luning et al., 2013; Losito et al., 2011; Youn & Sneed, 2003; Veiros et al., 2009; Akutsu et al.,

2005; São José et al., 2011; Esperança & Marchioni, 2011; Silva & Cardoso, 2011).

Supplier selection and the procurement of inputs have low levels of compliance with the current Brazilian Normative Instruction (Medeiros et al., 2012). Obtaining raw material from unreliable sources is a risk factor that contributes to the outbreaks of foodborne illnesses (Food and Drug Administration, 2009). A special focus should be placed on raw food of animal origin, which is considered particularly dangerous (Ebone et al., 2011). Fresh beef, when handled under inadequate sanitary conditions, can be a primary source of infection (Almeida et al., 2010). Thus, the quality of meat depends on the adoption of control measures and monitoring from the pre-slaughter period up to the meat consumption. All parties involved in the supply of meat should ensure the quality of the products (Conceição & Gonçalves, 2009).

In food services, the receipt of raw material is important to guarantee the safety of the final product (Silva & Cardoso, 2011; Associação Brasileira de Normas Técnicas, 2008). Therefore, it is imperative to adapt it in order to follow to the principles of good practice, particularly the reception area, process control, and supplier evaluation, and transport system. This is above and beyond the technical visits and observation of the adequacy of the transportation system utilized (Associação Brasileira de Normas Técnicas, 2008; Agência Nacional de Vigilância Sanitária, 2004). The procedures still do not include laboratory tests to establish whether the products are suitable for use to ensure that only suitable products that are in good conditions

are used in the preparation of foods (Codex Alimentarius Comission, 2009).

This study aimed to investigate the procedures used to ensure the sanitary conditions of the raw materials in the reception of meat in university campus restaurants in Federal Institutions for Higher Education (IFES) in the North, Northeast, Midwest, Southeast, and South regions of Brazil.

2 Materials and methods

2.1 Research place and studied population

The present study was conducted from September 2011 to February 2012 in university campus restaurants of IFES located in the five regions of Brazil (North, Northeast, Midwest, Southeast, and South). All operating IFES institutions (N=59) were contacted by e-mail and phone calls to verify the existence of a university campus restaurant in the institution. It was found that some institutions (n=14) did not have restaurants in the campus. The restaurants run by an outsourcer company without direct supervision by the IFES (n=8 of the existing IFES restaurants, n=45) were excluded. The university campus restaurants that were run directly by the IFES or by an outsourcer company that is under the direct supervision of the IFES were included. The party responsible for the participating restaurants (n=35) completed a form agreeing to the terms of the research.

The final samples of restaurants were classified by convenience according to the number of meals served daily: small size, less than 1000 meals/day; midsize, from 1000 to 5000 meals/day; and large size, more than 5000 meals/day.

2.2 Research instruments

The research instrument consisted of four blocks; the first three blocks consisted of a questionnaire with closed-ended questions and two open-ended questions (type and number of meals served). The fourth block consisted of an evaluation list with two response options: proper or improper. The fourth block also included one closed-ended question about the laboratory testing of raw materials (response options: yes or no) and one open-ended question (about the type of laboratory testing and the place where it is performed).

Block I included university restaurant identification data. Block II addressed the types of meat used. The data from block III included the acquisition of raw materials. Finally, block IV asked about Good Practice procedures for the receipt of raw materials, as recommended by federal law (transportation of raw materials (Agência Nacional de Vigilância Sanitária, 2004), reception area, quality control, and handling (Agência Nacional de Vigilância Sanitária, 2002)). This research instrument was previously tested in a university restaurant run by the IFES of Rio Grande do Sul.

The method proposed by Saccol et al. (2012) was used in the evaluation of adherence to Good Practice guidelines for the receipt of raw material (block IV). The Grand Total of the items analyzed and the total of the suitable items were considered. The statistic used was the ratio between the total of the suitable items

and the Grand Total of the items analyzed multiplied by 100, and the result was expressed as a percentage. The restaurant facilities were classified according to the compliance percentage: Very Good - 91.0-100.0%; Good - 70.0-90.0%; Regular - 50.0-69.0%; Poor - 20.0-49.0%; and Very Poor - 0.0-19.0% (Saccol et al., 2012).

2.3 Data collecting and ethical aspects

The consent form of the research project was available online; thus, the restaurant nutritionist could easily complete it. Data gathering was performed using a tool that was developed specifically for this study and was available online from September 2011 to February 2012. The forms were completed by the restaurant nutritionist, and the results were accessed by e-mail.

The Committee of Ethics and Research of the Federal University of Santa Maria approved the ethical and methodological aspects of the research on September 13, 2011 (CAAE 0209.0.243.000-11).

2.4 Statistical analysis

Descriptive statistics (absolute frequency, mean, and median) was used with the IBM PASW Statistical version 18. For comparison between the categorical variables, the Fisher' Exact Test was used at 5% level of significance (Lopes et al., 2008).

3 Results

A total of 71 (seventy-one) university campus restaurants serving approximately 135000 meals/day were investigated; they were located in the following regions: North (7505), Northeast (27297), Midwest (10444), Southeast (48910), and South (40875). The results show that one or more choices of meat were available in those restaurants. Beef and chicken were offered more than once a week in most restaurants (Figure 1).

The data analysis demonstrated significant differences between their management systems, such as the procedure for the acquisition of raw material (p=0.002) and the key suppliers (p=0.049). In IFES-managed restaurants (n=20), the acquisition of raw material in 95.0% of locations occurred through the form
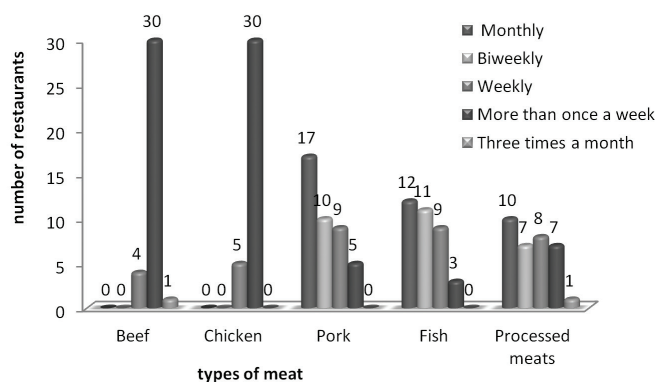

Figure 1. Different types of meat displayed on the menu as a function of the number of university campus restaurants in Federal Institutions of Higher Education in the five regions of Brazil.

of competitive bidding, in which the selection criterion for the product is the lowest price. In this case, the meat was supplied by slaughterhouses/cold stores (10.0%), wholesalers (25.0%), or manifold suppliers (65.0%). As for the outsourced restaurants (n=15), the meat was purchased directly from the supplier (40.0%), through competitive bidding (33.3%), without bidding (13.3%), or through other procedures (13.3%). Cold stores were the major suppliers in 46.6% of these restaurants.

As shown in Table 1, the nutritionist and his or her staff were responsible for handling food in most restaurants (n=27) and participated in the supervision over sanitation and hygiene matters (n=18) during the receipt of the meats. The most frequently mentioned hygienic and sanitary requirements for the supplier were the requirement of product registration by the Inspection Service (n=11) and supplier regulation by the Health Surveillance Agency (n=16). The main monitoring activities were the technical visit and the records on suppliers.

It was found that the transport system had major flaws. The certificate of inspection for the meat carrier vehicle and the personal hygiene of the suppliers were inadequate in approximately half of the sites (n=17). Most restaurants had adequate reception areas (n > 30). The North region differed from the other regions ($p < 0.050$); it showed weaknesses regarding cleanness and isolation of the reception area. It is worth mentioning that slightly more than half of the restaurants had suitable drains (n=19), doors, windows, and sinks for personal hygiene (n=20) (Table 2).

Each restaurant had established criteria for the selection of raw material, which was inspected at the reception area (n=34), and the supervisory technical employee carried the identity and quality standards of the products available (n=32). The North region also differed from the other regions (p <0.050) because the restaurants did not keep records of the monitoring on spreadsheets. Nevertheless, only half of the restaurants evaluated monitored the temperature of the meat upon reception. As for the product packaging, most establishments assessed integrity (n=34), the absence of hazards and food safety risks (n=32) and labeling (n=33). It was found that 25.7% of restaurants (n=9) had a recycling program for the meat packaging, of which 14.3% were located in the Southeast (n=5), 5.7% in the Midwest (n=2), and 5.7% in the South region (n=2). The North and Northeast regions differentiated themselves from the others (p <0.020) by not recycling product packages.

All of the restaurants used raw materials in good condition, and most of them adequately returned meat that was not in good condition (n=34), meat handlers wore protective clothing (n=31), washed their hands properly (n=29), and used sanitized utensils/equipment (n=34) (Table 2). However, only 2 (5.7%) restaurants routinely performed laboratory tests for quality control of meat acquisition.

Table 1. Acquisition of meat in university restaurants of Federal Institutions of Higher Education in the five regions of Brazil.

Meat Acquisition	North n=4	Northeast n=9	Midwest n=4	Southeast n=10	South n=8	IFES[a] n=35
Supervision of reception activities						
Nutritionist	100.0	66.7	75.0	70.0	87.5	77.1
Qualified employees	-	22.2	25.0	30.0	12.5	20.0
Untrained Employees	-	11.1	-	-	-	2.9
Planned purchases						
Nutritionist	100.0	88.9	75.0	80.0	62.5	80.0
Qualified employees	-	-	25.0	20.0	12.5	11.4
Untrained Employees	-	11.1	-	-	-	2.9
Not held by the restaurant	-	-	-	-	25.0	5.7
Hygiene and sanitary control at reception						
Nutritionist	25.0	22.2	25.5	10.0	37.5	22.9
Qualified employees	-	11.1	25.0	10.0	12.5	11.4
Untrained Employees	-	22.2	-	-	-	2.9
Team (NUT; FUN CAP)[b]	75.0	44.4	50.0	60.0	37.5	51.4
Team (FUN CAP)[c]	-	-	-	10.0	12.5	5.7
Requirements for suppliers						
No requirements	25.0	22.2	25.0	-	12.5	14.3
Product registered in the inspection service	25.0	55.6	25.0	40.0	-	31.4
Company's VISA[d] regulations	25.0	22.2	50.0	40.0	87.5	45.7
Other	25.0	-	-	20.0	-	8.6
Supplier monitoring						
Interview	-	22.2	-	-	-	5.7
Technical visit	25.0	33.3	-	50.0	50.0	37.1
Supplier registration	25.0	33.3	100.0	30.0	37.5	40.0
Other	25.0	11.1	-	10.0	12.5	11.4

Results in %. a-IFES- Federal Institutions of Higher Education. b-NUT- Nutritionist; c-FUN CAP- qualified employees; d-VISA- health surveillance.

Table 2. Reception of meat in university campus restaurants of Federal Institutions of Higher Education in the five regions of Brazil.

Reception of meat	North n=4	Northeast n=9	Midwest n=4	Southeast n=10	South n=8	IFES[a] n=35	p[b]
Raw material transportation							
Hygiene, Vehicle maintenance	75.0	55.6	75.0	90.0	75.0	74.3	0.583
Food Exclusiveness	75.0	66.7	75.0	80.0	75.0	74.3	0.317
Private cabin in the vehicle	75.0	88.9	50.0	90.0	87.5	82.9	0.308
Has certificate of inspection	25.0	44.4	25.0	60.0	62.5	48.6	0.567
Closed, isothermal or closed refrigerator	50.0	66.7	25.0	90.0	62.5	65.7	0.176
Maintains the temperature of the meat	50.0	77.8	50.0	90.0	62.5	71.4	0.424
Delivery personnel properly attired and/or groomed	25.0	44.4	75.0	60.0	37.5	48.6	0.316
Reception area							
Clean and isolated	50.0	100.0	100.0	100.0	87.5	91.4	0.023
Wide, ventilated, easy access	50.0	77.8	100.0	100.0	87.5	85.7	0.116
Covered area	100.0	100.0	75.0	100.0	87.5	94.3	0.202
Resistant, Anti-slip and easy to clean floor	75.0	77.8	100.0	80.0	87.5	81.8	1.000
Siphoned, lidded Drains	50.0	66.7	50.0	50.0	50.0	54.3	0.736
Sink for hand hygiene	50.0	66.7	50.0	60.0	50.0	57.1	0.789
Protected doors and windows	50.0	55.6	50.0	80.0	62.5	62.9	0.713
Quality control							
Preestablished criteria	100.0	88.9	100.0	100.0	100.0	97.1	0.714
Inspection and approval	75.0	100.0	100.0	100.0	100.0	97.1	0.229
Technician has features of identity standards and quality of raw materials available	100.0	77.8	75.0	100.0	100.0	91.4	0.218
Control spreadsheets	-	33.3	75.0	90.0	37.5	51.4	0.008
Controlled temperature	25.0	33.3	50.0	80.0	50.0	51.4	0.252
Package integrity	100.0	88.9	100.0	100.0	100.0	97.1	0.714
Labeling according to legislation	100.0	77.8	100.0	100.0	100.0	94.3	0.383
Non-hazardous raw material that cannot be reduced to acceptable levels	100.0	77.8	100.0	90.0	100.0	91.4	0.959
Only raw materials in good conditions are used	100.0	100.0	100.0	100.0	100.0	100.0	1.000
Rejected batches are returned immediately	100.0	100.0	75.0	100.0	100.0	97.1	0.229
Should immediate return fail, rejected batches are identified and stored separately until final destination	100.0	100.0	100.0	100.0	87.5	97.1	0.457
Handling of raw materials							
Handler with protective clothing	75.0	88.9	75.0	90.0	100.0	88.6	0.632
Hands washed thoroughly during handling products	100.0	66.7	75.0	100.0	75.0	82.9	0.244
Utensils in contact with raw materials are sanitized	100.0	100.0	100.0	100.0	87.5	97.1	0.457

Results in %. a-IFES- Federal Institutions of Higher Education. b-Fisher's Exact Test.

The restaurants in the Southeast region had the highest percentage of adequacy regarding the receipt of raw materials (88.6%), followed by the South (79.0%), Midwest (75.9%), Northeast (75.8%) and North regions (70.5%). It is important to mention that most problems relating to meeting safety requirements were associated to the transport system (66.5%), reception area (75.5%), meat handling (85.7%), and quality control (87.8%), which showed the highest consistency.

When evaluating the influence of the number of meals served by the restaurants on the adherence to regulations, it was found that most of the facilities that were between 90.0 and 100.0% compliant were large restaurants. None of the small restaurants reached this percentage. This analysis reveals that, in our sample, the larger the restaurant, the more it met safety criteria for raw materials (Table 3).

Table 3 shows the classification of restaurants by region according to the adequacy of the items evaluated. It was found that more than half of university campus restaurants met between 70.0 and 90.0% of the requirements, but one restaurant in the North region and one Northeastern restaurant had adequacy below 50.0%. It is noteworthy that almost all establishments with more than 90.0% compliance were located in the Southeast region.

4 Discussion

The restaurants rated represented a diverse sample of the university community, which confirms assertions about the increasing consumption of meals eaten outside of the home (Instituto Brasileiro de Geografia e Estatística, 2011). The demand for these services has grown significantly with the

Table 3. Classification of university restaurants of Federal Institutions of Higher Education based on the conformity of quality parameters of meat at reception according to the size and the five different regions of Brazil.

Classification[a]	Very Good n=8	Good n=20	Regular n=5	Bad n=2	Too Bad n=0
Size of restaurants					
Small size	-	15.0	-	50.0	-
Midsize	50.0	65.0	80.0	50.0	-
Large size	50.0	20.0	20.0	0.0	-
Regions of Brazil					
North	-	15.0	-	50.0	-
Northeast	12.5	25.0	40.0	50.0	-
Midwest	-	15.0	20.0	-	-
Southeast	62.5	20,0	20.0	-	-
South	25.0	25.0	20.0	-	-

Results in %. a-Very Good - 91.0-100.0%; Good - 70.0-90.0%; Regular - 50.0-69.0%; Poor - 20.0-49.0%; Very Poor - 0.0-19.0%.

implementation of the IFES support plan for the Restructure and Expansion of Federal Universities, which presents guidelines for the expansion of inclusive policies and student assistance (Brasil, 2008a).

The frequency of inclusion of meat in the menu in university campus restaurants resembles the data of the Household Budget Survey of 2008-2009, which shows that beef accounts for the highest quantity of calorie consumed, followed by chicken, sausages, pork, and fish (Instituto Brasileiro de Geografia e Estatística, 2010). The inclusion of meat in the menu meets the recommendations of daily intake of proteins (Brasil, 2008b). It is known that beef is among the five most common foods consumed in Brazil (Souza et al., 2013) and that meat is related to a great number of foodborne illness outbreaks (Brasil, 2011; Xue & Zhang, 2013).

According to the law and to the results of the Brazilian university campus restaurants evaluated the need for the presence of a nutritionist to fulfil professional roles responsibilities is evident. With to the goal of ensuring the safety of the food produced, a nutritionist oversees the origin of the raw material as well as plans purchases and coordinates the receipt of the raw materials (Conselho Federal de Nutricionistas, 2006). The role of the nutritionist is related to the implementation of Good Practices and safe food production (Akutsu et al., 2005; Santos et al., 2012).

The Brazilian legislation and the Technical Standards have not established requirements for the training of the technical manager of food services, except for those places that require a legal supervision (Associação Brasileira de Normas Técnicas, 2008; Agência Nacional de Vigilância Sanitária, 2004), such as industrial kitchens and nutrition/dietetic services, which can are allowed to provide services only under the supervision of a nutritionist (Brasil, 1991; Conselho Federal de Nutricionistas, 2008).

Accordingly, it should be noted that proper supervision of raw material reception by qualified professionals is fundamental for the selection of suitable raw materials.

The criteria for the evaluation and selection of suppliers should be explicitly described by the food service (Agência

Nacional de Vigilância Sanitária, 2004). It is safe to purchase products that have been inspected and certified, preferably from establishments that have implemented quality control programs (Associação Brasileira de Normas Técnicas, 2008; Agência Nacional de Vigilância Sanitária, 2002). Most of the restaurants studied are managed by the IFES (Conselho Federal de Nutricionistas, 2006), in which the meat supplier is selected by the competitive bidding process. Therefore, the administrative system of the restaurants interferes with meat acquisition because the competitive bidding process limits the selection of suppliers and raw materials. Competitive bidding is aimed at purchasing assets and services with transparency, legality at the lowest prices. Among the modalities of the competitive bidding, the Electronic Bidding is a government strategy aimed to the rescue of transparent management with due respect to the interest and public property (Silva & Bezerra, 2013). The lowest bidder will be selected to supply the product.

The food transport system is included as a criterion to be evaluated to ensure safety of the raw material (Agência Nacional de Vigilância Sanitária, 2002). Meat requires time and temperature control for safety to limit the proliferation of pathogenic microorganisms and toxin formation (Food and Drug Administration, 2009). It should be transported at the proper temperature and under appropriate hygienic conditions (Agência Nacional de Vigilância Sanitária, 2004). To ensure products integrity, vehicles must use control instruments that allow the maintenance of the proper temperature (Agência Nacional de Vigilância Sanitária, 2002). Therefore, their Food Transport License must be verified by the restaurants (Associação Brasileira de Normas Técnicas, 2008) because it verifies the suitability of the vehicle for the transportation of the product.

The receipt of raw materials should be performed in a protected area (safe from rain, sun, and dust) that is clean, free of obsolete or unrelated objects, and separated from other activities to avoid cross-contamination (Agência Nacional de Vigilância Sanitária, 2004). Federal health legislation includes standards for the design and construction of physical food service facilities.

Studies demonstrate non-compliance of food service hygiene and sanitation requirements. Inadequacies in floor

drainage, protective screens over windows, record control, monitoring of the receipt of raw material, personal hygiene (Veiros et al., 2009), monitoring of vehicles' hygiene conditions, temperature control for perishable commodities, physical infrastructure for meat reception, and in the handling of reception by qualified staff were observed (Silva & Cardoso, 2011).

The main deficiencies observed in the university restaurants evaluated were related to the implementation of preventive measures for the control of vectors and urban pests, which should be based on the installation of mechanical barriers (Associação Brasileira de Normas Técnicas, 2008; Codex Alimentarius Comission, 2003). Additionally, the presence of properly identified dedicated sinks suitable for personal hygiene (Agência Nacional de Vigilância Sanitária, 2004) and accessible to handlers at all times (Food and Drug Administration, 2009) was not present in all facilities studied hindering the fulfilment of the guidelines for proper handwashing (Agência Nacional de Vigilância Sanitária, 2004). Wu (2012) warns that the commitment of management team is extremely important for the implementation of strategies for food security.

Meat temperature must be checked upon receipt to ensure product safety (Associação Brasileira de Normas Técnicas, 2008; Agência Nacional de Vigilância Sanitária, 2002) because it is a parameter that greatly influences the proliferation of pathogens and spoilers (Chaves, 2012). In the present study, temperature control was not performed in all locations. However, almost all of the restaurants that have been performing inspection and approval of raw material considering the predefined criteria based on food safety (Agência Nacional de Vigilância Sanitária, 2004; 2002).

This study included the evaluation of cleaning, the integrity of the primary packaging, and the particularities of each food (Associação Brasileira de Normas Técnicas, 2008; Agência Nacional de Vigilância Sanitária, 2004), however, only a few restaurants adopted a meat packaging recycling program. Santos et al.(2012) observed that lack of concern for environmental issues and non-compliance with the legislation regarding waste collection were evident. Only 29.7% of the facilities evaluated had implemented a system for the separation of recyclable materials.

The mandatory information on labels of packaged animal products, as established by Normative Instruction number 22/2005, should include lot number, manufacturing date, expiration date, and type of storage (Brasil, 2005).Traceability is considered relevant since it can contribute to increase consumer confidence in food safety (Andrade et al., 2013). Labels have an important role in food choice since they offer a great deal of information on the nutrient contents of foods (Cavada et al., 2012). Traceability assures certain intrinsic characteristics of food products, their origin, and the certificates of quality management and safety systems (Nitzke et al., 2012).

The findings of this study concur with the general principles of food hygiene, which require the rejection of raw materials containing hazards that cannot be reduced to acceptable levels through preparation processes. The batches that do not meet the standards of quality and safety must be rejected and returned immediately to the supplier or properly identified and stored in a separate location until they can be sent to their final destination (Food and Drug Administration, 2009; Associação Brasileira de Normas Técnicas, 2008; Agência Nacional de Vigilância Sanitária, 2004).

The control measures adopted upon food reception must be proportional to real product safety risks. In order to ensure good condition for food preparation, laboratory tests should be performed on raw materials (Associação Brasileira de Normas Técnicas, 2008; Silva & Bezerra, 2013). However, additional laboratory tests are not a reality in the majority of Brazilian university restaurants.

The personal hygiene of food handlers, including suitable, clean and appropriate clothing and adequate hand washing and disinfection, observed in most of the restaurants studied, is very important to ensure the hygienic and sanitary conditions of food (Silva & Bezerra, 2013). These steps are essential to prevent foodborne illnesses since the lack of personal hygiene is one of the risk factors often associated with outbreaks (Food and Drug Administration, 2009). The same requirements for food handlers, such as adequate clothing and adoption of personal hygiene practices in accordance with health standards, should also be complied by the food suppliers (Associação Brasileira de Normas Técnicas, 2008; Agência Nacional de Vigilância Sanitária, 2004, 2002).

In the analysis of Good Practice procedures during meat receipt, higher levels of adequacy were observed for the restaurants located in the Southeast region of the country, which can be explained by the pioneering laws and regulations established by the State of São Paulo concerning Good Practices in food services (São Paulo, 1999, 2013).

The conditions in Brazilian university campus restaurants were better than those observed in a study by Veiros et al. (2009) on food services in a Portuguese university; the authors found an overall score of 62% of compliance with procedures related to food safety.

The relationship between the size of the university restaurant and the implementation of Good Practices confirms that there is a positive relationship between the number of students and the adequacy of food security procedures and operations. In food services located in Spain, it was found that small restaurants had the lowest performance levels in terms of food security management (Luning et al., 2013). The major food companies exhibited fewer non-compliance issues, most likely due to a greater awareness of the importance of following the principles of food safety (Losito et al., 2011).

5 Conclusions

IFES provide the university community with a significant number of daily meals. The campus restaurants are managed by either IFES or in partnership with third-party companies. The restaurants evaluated offered one or two different types of meat; the most commonly available were beef and chicken.

The acquisition of raw material through competitive bidding in IFES-managed restaurants limits the selection of meat suppliers; therefore, restaurants should include the legal specifications in the competitive bidding announcement. Monitoring was carried out through a technical visit to the suppliers and a review of their past records.

It was concluded that the university campus restaurants, especially the larger facilities located in the Southeast region, meet most of the safety standards and legislation established to ensure the hygienic and sanitary conditions for the receipt of meat. However, it is evident that in some locations there are weaknesses pertaining to the suitability of the facility, the evaluation of the raw material transport system, and records and control measures for reception of meat.

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