



Hygiene assessment of Serbian meat establishments using different scoring systems



Ivan Nastasijevic^{a,*}, Igor Tomasevic^b, Nada Smigic^c, Dragan Milicevic^a, Zoran Petrovic^a, Ilija Djekic^c

^aInstitute of Meat Hygiene and Technology, Kacanskog 13, 11040 Belgrade, Serbia

^bDepartment of Animal Origin Products Technology, University of Belgrade, Faculty of Agriculture, Nemanjina 6, 11080 Belgrade, Serbia

^cFood Safety and Quality Management Department, University of Belgrade, Faculty of Agriculture, Nemanjina 6, 11080 Belgrade, Serbia

ARTICLE INFO

Article history:

Received 21 July 2015

Received in revised form 28 September 2015

Accepted 25 October 2015

Available online 29 October 2015

Keywords:

Hygiene assessment
Meat establishments
Process hygiene
Risk categorization
Meat inspection

ABSTRACT

The recent proposals for modernization of the meat inspection system across the EU recommend that it should be risk-based and also suggest that risk categorization of slaughterhouses should be based on a process hygiene output through the use of indicator organisms – Aerobic Colony Count (ACC) and *Enterobacteriaceae* count (EC), monitored on carcasses. In this study, the evaluation of the hygiene of operations in cattle and pig slaughterhouses/meat processing companies in Serbia was carried out through two methodologies: a) auditing based on scoring systems used in the UK and Australia; and b) microbial process hygiene indicators. The results confirmed that slaughterhouses with higher levels of hygiene had lower ACC and EC levels. The complementary nature of the methodologies may be effectively used in a process of risk categorization of slaughterhouses. To achieve better consistency and objectiveness in the assessment process, the intensive and structured training of regulatory authorities (official veterinary inspectors, meat inspectors) will be essential.

© 2015 Elsevier Ltd. All rights reserved.

1. Introduction

The recent proposals for the modernization of meat inspection system across the European Union (EU) recommend that it should be risk-based (EFSA, 2011; EFSA, 2013). The main difficulty in the proposed meat inspection modernization is switching from the traditional protocol (i.e. ante-mortem and post-mortem examination at slaughterhouse) to fulfilling process hygiene criteria (PHC), through the use of indicator organisms – Aerobic Colony Count (ACC) and *Enterobacteriaceae* count (EC), monitored on carcasses.

The current meat safety assurance system relies mainly on traditional meat inspection which enables only detection of biological hazards to public health which form grossly visible lesions, but does not detect those hazards that do not cause macroscopically visible lesions in animals. However, such hazards can be present in animals' gastrointestinal tracts (Buncic et al., 2013) and subsequently can be transferred to carcasses during slaughter and dressing operations (Blagojevic & Antic, 2014). The control of ma-

ior meat borne hazards relevant for public health, e.g. *Salmonella* spp. and Verocytotoxigenic *Escherichia coli*, which cannot be detected via this traditional meat inspection system, may be improved through the implementation and monitoring of proper process hygiene at slaughter/dressing. However, the compliance of a food business operator (FBO) with microbiological PHC only shows that hygiene of slaughter and meat processing operations is at an acceptable level. The indicators monitored on carcasses (ACC, EC) indicate whether the process hygiene functions acceptably, but they do not control the hazards *per se*. The control and reduction of microbial contamination through hide-to-carcass ratio can be verified through the monitoring of indicator microorganisms on carcasses at the end of slaughter, allowing comparison of the process performance between abattoirs (Zweifel, Capek, & Stephan, 2014).

In the UK, the Manual for Official Controls (MOC), which details the tasks, responsibilities and duties Food Standards Agency staff and veterinary contractors must undertake to assess hygiene in meat establishments, recently entered into force (FSA, 2013).

The Australian approach, called Meat Hygiene Assessment (MHA), is integral to the implementation of Hazard Analysis and Critical Control Points-based (HACCP-based) meat safety

* Corresponding author. Kacanskog 13, 11000 Belgrade, Serbia.
E-mail address: ivann@inmesbgd.com (I. Nastasijevic).

management systems and is based on visual monitoring and assessment of hygienic operations in slaughter/dressing. This model provides outcomes whereby the level of hygiene is quantified. Introduced in 1996 in all exporting Australian slaughterhouses, MHA has resulted in significant improvement in process hygiene (MHA, 2002).

Microbial process hygiene monitoring in the Serbian meat industry is performed on a regular basis in accordance with the EU criteria (EC, 2005; Serbia, 2010b). Limits for indicator microorganisms, ACC and EC, detected by both excision sampling and wet-dry swabbing for cattle and pig carcasses, are given.

Although the monitoring of microbial process hygiene in Serbian meat establishments is implemented, official auditing based on a hygiene assessment scoring system and its correlation with process hygiene still does not exist. Therefore, the objective of this study was to evaluate the hygiene of operations in cattle and pig slaughterhouses/meat processing companies in Serbia through: a) audits based on scoring systems used in the UK and Australia; and b) microbial process hygiene indicators.

2. Material and methods

2.1. Characterization of companies

This study included ten Serbian cattle and/or pig slaughterhouses/meat processing companies: four slaughterhouses and six meat processing plants. All investigated slaughterhouses also performed meat processing; however, they are considered as separate establishments in this study, but denoted with the same letters (A, B, C and D). Companies A and B are large slaughterhouses/meat processing plants and EU exporters. Companies C and D are small slaughterhouses/meat processing plants and non-EU exporters. Companies E and F are small meat processing plants and non-EU exporters.

The companies studied produce about 58.5% of Serbia's national production of raw beef/pork meat and 56.3% of the processed meat (Yearbook, 2014). Classification of the size of the meat establishment was based on their factual daily throughput. In this study, large slaughterhouses had slaughter capacity of >40 cattle/day and/or >500 pigs/day; small slaughterhouses had slaughter capacity of <40 cattle/day and/or <500 pigs/day. Large meat processing plants had processing capacity of >20 t meat/day; small processing plants had processing capacity of <20 t meat/day. Exporting meat establishments were authorized by the Serbian competent authorities for the export of raw meat/meat products to three different markets, the European Union, Russia (the Eurasian Customs Union) and countries of the Central European Free Trade Association (CEFTA).

2.2. Data collection

Data used in this study were collected by direct, on-site observations of hygienic operations at slaughter/meat processing plants and from process hygiene databases provided by the meat establishments. Authors contacted the companies in advance, emphasizing that this study was not an official inspection/audit and that companies should not perform any preparation activities, in order to obtain objective results which accurately reflected the hygienic status of the establishment. However, the date of the visit was not announced to meat establishments.

The on-site survey was conducted during the period September–December 2014. Parallel to that survey, data on microbial process hygiene were obtained for the period January–December 2014, to assess the microbial trends throughout the year.

No major changes in the production process (equipment, workers or suppliers) were documented in the meat establishments during that year. On-site visits of all companies were performed once by a single auditor; they were accompanied by company technical managers and HACCP team leaders, who were interviewed for this survey. During the on-site survey, we observed hygienic operations and procedures at slaughter/dressing and meat processing, and obtained data from microbiological process hygiene controls that companies had performed from January 2014 until the date of the visit, as well as any HACCP documentation available. The data collected during the on-site survey provided a snap-shot of current hygiene practices at the time of the visit.

2.2.1. UK methodology for official controls in meat establishments (MOC)

The UK food hygiene assessment scoring system is a protocol developed for audit of FBOs, the Manual for Official Controls (MOC) (FSA, 2013), and it consists of five parts: (i) risk factors deployed through potential hazards (microbiological, chemical and physical), vulnerable consumers potentially at risk and throughput; (ii) FBO actions deployed with production controls relating to carcass processing, hygienic processing within cutting plants dealing with unprocessed products (cutting, dicing and mincing), hygienic production within cutting plants dealing with processed products (meat preparations, ready to eat meat products), environmental hygiene/good hygiene practice and HACCP practice; (iii) animal disease (slaughterhouse only); (iv) animal welfare (slaughterhouse only); (v) animal by-products management and transmissible spongiform encephalopathies (TSE)/specified risk material (SRM) controls. Assessment scores define the minimum frequency of audits by the inspection services (FSA, 2013). The scores are: good (0); adequate (5); weak (15); poor (25); N/A (0) - non applicable. The minimum inspection frequency is planned based on the final score: 0–50 (at least once every 12 months), 55–85 (at least once every 8 months), 90–105 (at least once every 5 months), 110–150 (at least once every 3 months), and >155 (at least once every 2 months). We note that as of August 2015, the latest version of the UK Manual for official controls has been implemented, but our study necessarily uses the older version (FSA, 2013).

2.2.2. Australian Meat Hygiene Assessment (MHA)

The Australian MHA is a tool for the objective monitoring of production processes, to assess the efficiency of hygiene programs and sanitation, and operations on the slaughter floor, in the of-fal room, boning room and during refrigeration and storage of the product, with a view to minimizing microbial contamination. MHA requires the routine visual examination of the procedures used in each task and at each process step in the production areas. Additionally, the system is applied to meat processing operations and livestock handling procedures. This methodology is based on Good Hygienic Practice (GHP-based) rather than being HACCP-based. The slaughter process control consists of the five modules, as follows: (i) slaughtering, (ii) of-fal handling, (iii) boning, (iv) cold chain management/chilled/frozen meat handling, and (v) livestock handling. The assessment of a process control is covered in one module. The general concerns are related to food safety (low and high risk), animal welfare and legislation. Weightings are applied when operations are found acceptable (low food safety risk), marginal (potential to affect food safety) or unacceptable (seriously affecting food safety). This information is then condensed to a single value, the Conformity Index (CI), which provides an overall picture of the process control (MHA, 2002).

Process ratings are categorized as acceptable ($CI \geq 80\%$), marginal ($70\% \leq CI \leq 79\%$) and unacceptable ($CI \leq 70\%$).

Download English Version:

<https://daneshyari.com/en/article/6390433>

Download Persian Version:

<https://daneshyari.com/article/6390433>

[Daneshyari.com](https://daneshyari.com)