



International 58th Meat Industry Conference “Meat Safety and Quality: Where it goes?”

Biological meat safety: challenges today and the day after tomorrow

Sava Buncic^{a,*}

^aDepartment of Veterinary Medicine, Faculty of Agriculture, Trg D. Obradovica 8, 21000 Novi Sad, Serbia

Abstract

The paper overviews the present status and challenges, as well as new and emerging longer-term issues, in the area of biological meat safety. It includes outlines of both prioritization process for biological meatborne hazards and global strategies for control of the priority hazards. It is concluded that modern meat safety assurance is meat chain- and risk-based, whilst the monitoring system should enable warning about any new and emerging meat safety issues.

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1. Main biological meatborne hazards - present status and challenges

1.1. Bacteria

Campylobacter - In the EU in 2013, there were 214,779 confirmed human cases (56 deaths; case fatality 0.5%). In the meat safety context, the most relevant are poultry meat and *Campylobacter jejuni* and *coli*. Overall, 31.4% of fresh broiler meat samples were positive in 2013 in EU. *Campylobacter* was found in 29.6 % of tested slaughter batches, 15.1 % of tested flocks and 30.4 % of tested animals. Strict implementation of biosecurity in primary production and GMP/HACCP during slaughter may reduce colonization of broilers with *Campylobacter*, and contamination of carcasses. After slaughter, risk reduction can be achieved by using hot water/chemical

* Corresponding author. Tel.: +381-21-485-34-40.
E-mail address: buncic_sava@hotmail.com

decontamination or freezing of carcasses.

Salmonella - In the EU in 2013, there were 82,694 reported and confirmed human cases (9 deaths; case fatality 0.14%), most commonly with *S. Enteritidis* and *S. Typhimurium* (39.5% and 20.2%, respectively). *Salmonella*-positives were most commonly fresh turkey meat (5.4%), followed by fresh broiler, pig and bovine meat. Some 0.2%, each, of the fattening turkey flocks and the broilers flocks were positive for these two target serovars. However, the BT-SAM model estimates that around 65% and 28% of the human cases are attributable to eggs and pigs, respectively. The main control measures for *Salmonella* in the meat chain are focused primarily on reducing the flock prevalence, but also improving process hygiene in abattoirs.

Yersinia - A total of 6,471 confirmed human cases of yersiniosis (two deaths; case fatality 0.05%) were reported in 2013 in the EU, predominantly *Yersinia enterocolitica* and strains of biotype 4 (serotype O:3) and biotype 2 (serotypes O:9). *Y. enterocolitica* findings were associated primarily with pig meat and products thereof. In pigs, *Y. enterocolitica* resides particularly in tonsils, and so head-to-carcass cross-contamination should be prevented in pig abattoirs. With regard to *Y. pseudotuberculosis*, serotype I is by far the most common serotype associated with human and animal infections (followed by serotype III); wild animals are probably the principal reservoir in Europe.

Verocytotoxigenic Escherichia coli (VTEC) - In 2013, 6,043 confirmed human cases (13 deaths; case fatality 0.36%) of VTEC infections were reported in the EU. The serogroups most commonly involved in human disease were O157, followed by O26. Serogroup O157 was primarily detected in ruminants (cattle, sheep and goats) and meat thereof; but O26, O87, O103 and O113 were also detected. The main focus of control measures for VTEC are prevention or reduction of contamination of meat at ruminant abattoirs; the effectiveness of on-farm controls for this pathogen is limited presently.

Listeria monocytogenes - In the EU in 2013, there were 1,763 confirmed human cases (191 deaths; case fatality 15.6%) of human listeriosis. Fish products (mainly smoked fish) were the most commonly contaminated retailed foods, followed by soft and semi-soft cheeses, RTE meat products and hard cheeses. The main control measures for foodborne listeriosis are focused primarily on maintaining high standards of hygiene of food processing and related environment, and on suppression of the pathogen's growth in processed foods including meats.

Antimicrobial resistance (AMR) - Of particular interest are ESBL, AmpC and MRSA. ESBL (extended-spectrum β -lactamases) are plasmid-coded enzymes, found in *Enterobacteriaceae* and mediating resistance to different β -lactam antibiotics. AmpC (AmpC β -lactamases) are enzymes cephalosporinases, coding for which is on chromosomal DNA in many Gram-negative bacteria, mediating resistance to penicillins and 3rd/4th generation cephalosporins. Bacterial groups most commonly carrying those AMR genes are *Escherichia coli* and non-typhoid *Salmonella*; including those associated with poultry and meat thereof. Presently, comparative efficiency and prioritisation of control options to reduce public health risks caused by ESBL and/or AmpC-producing bacteria related to food-producing animals is still unclear. Nevertheless, a measure based on restricting or stopping all uses of systemically active 3rd/4th generation cephalosporins in food animals is considered as highly effective. MRSA (Methicillin resistant *Staphylococcus aureus*) is widespread in the EU as a hospital infection. CC398 is most common MRSA clone associated with asymptomatic carriers in meat animals (pigs, calves, poultry), and also abattoirs and raw meat, but no related meat/food-borne MRSA disease has been documented to date.

1.2. Parasites

Trichinella - In 2013, 217 confirmed trichinellosis cases (one death; case fatality 0.56%) in humans were reported in the EU. Domestic pigs and hunted wild boar had prevalences of 0.0002% and 0.1%, respectively (vast majority in Eastern Europe). The main *Trichinella* control measures include pig production under controlled conditions, testing of slaughtered pigs, or inactivation of the parasites in the meat (sufficient freezing, heat treatment). In endemic regions, education of farmers, hunters and consumers is also an important risk reduction measure.

Toxoplasma gondii - There are numerous routes of human infection with this parasite. In the EU, *Toxoplasma* was reported in pigs, cattle, sheep, goats, dogs, cats, wild boars, deer, water buffaloes, and some other wildlife animal species. Pigs, particularly outdoor raised pigs, and small ruminants are the most relevant animal species for meatborne toxoplasmosis. *Toxoplasma* prevalence in pigs varied between EU countries, from 0% to 25.8%. The main *Toxoplasma* control measures include either testing of slaughtered pigs/sheep/goats or inactivation of the

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