



Prevalence of major foodborne pathogens in food confiscated from air passenger luggage



Dagmar Schoder^{a,b,*}, Anja Strauß^{a,1}, Kati Szakmary-Brändle^a, Beatrix Stessl^a, Sabine Schlager^c, Martin Wagner^a

^a Institute for Milk Hygiene, Milk Technology and Food Science, University for Veterinary Medicine, Vienna, Austria

^b Veterinarians Without Borders, Austria

^c Austrian Agency for Health and Food Safety, Graz, Austria

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ABSTRACT

The EU has issued several directives and regulations pertaining to the importation of animals and products of animal origin (POAO) and veterinary controls on importation. Unfortunately, little information is available concerning associated risks and no attempts have been made to collect baseline data on the actual prevalence of zoonotic agents in POAO carried by travellers. To meet these challenges the EU recently introduced and financed a research project “PROMISE”. Its main objectives were to assess the risks involved when foodborne pathogens are introduced to the EU via uncontrolled imports. With special permission of the Austrian health authorities, spot-checks were made of the luggage of 61,355 passengers from 240 flights from non-EU countries arriving at the Vienna International Airport (VIE airport). Over a period of eight months (August 2012 through March 2013) 1473 POAO items were confiscated. A total of 600 samples were suitable for *Salmonella* spp., *Campylobacter* spp., verotoxigenic *Escherichia coli* and *Listeria monocytogenes* prevalence analysis. Foodborne pathogens could be detected in 5% (30/600) of all samples. The highest prevalence was attributed to *L. monocytogenes*, at 2.5%, followed by VTEC and *Salmonella* spp. at 1.3% and 1.2%, respectively. *Campylobacter* spp. was not present in any of the 600 samples. Multi-locus sequence typing (MLST) of *L. monocytogenes* revealed that current sequence types (ST) corresponded to the worldwide most present clonal complexes 1, 2, 3, 5, 9, and 121. Generally, *L. monocytogenes* ST9 was the predominant allelic profile, which was mainly isolated from Turkish meat products.

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1. Introduction

The objective of the European Union (EU) food safety policy is to protect consumer health. To achieve this objective the EU ensures that control standards for food and food hygiene, and animal health and welfare are established and implemented. However, this must be balanced by other ambitions. For example, the 1957 Treaty of Rome and its revisions (EuroKnow, 2012) stipulate freedom of movement of goods, people and services within the EU. This not only has an economic foundation, but also serves general public interests. Since the EU Schengen Agreement was established in 1985, and further expanded in 1997, there has been even more freedom of travel for people and trading of goods, including food products. In the context of freedom of movement of goods this has pushed controls to the outer borders of the EU. As a consequence the limited numbers of EU border inspection

posts focus mainly on travellers and commercial imports from third countries, which are those countries that are not members of the EU. These posts are found at airports, sea ports and major railway, road and post entry stations.

The EU has issued several directives and regulations pertaining to the importation of animals and products of animal origin (POAO) and veterinary controls on importation: EC 206/2009 (covering POAO), EC 97/78, 91/496/EC, EC 136/2004 and EC 2007/275 (veterinary checks on animals and POAO at border inspection posts; EC, 1991, 1997, 2004, 2007, 2009a). However, most of these fundamentals only refer to commercial trade in food and food products and usually only in large quantities (EC, 2012). Nonetheless, some food products are exempted from customs control. Among these products are those intended for personal consumption, which are potentially present in traveller luggage, those sent by post in small volumes to individuals and those sent as trade samples (EC, 2012; FVO, 2013; see also directives 91/496/EC and 97/78/EC (EC, 1991, 1997)).

Transmission of zoonotic bacteria to humans can either occur via animal contacts or by contaminated food. Unfortunately, little information

* Corresponding author. Tel.: +43 1 25077 3520; fax: +43 1 25077 3590.

E-mail address: dagmar.schoder@vetmeduni.ac.at (D. Schoder).

¹ Joint first authors.

is available concerning associated risks and no attempts have been made to collect baseline data on the actual prevalence of zoonotic agents in POAO carried by travellers.

To meet these challenges the EU recently introduced and financed a research project, “PROMISE” (protection of consumers by microbial risk mitigation through combating segregation of expertise) (Promise, 2012). PROMISE is coordinated by the University of Veterinary Medicine, Vienna, Austria. The project’s main objectives are to assess the risks involved when foodborne pathogens are introduced to the EU via uncontrolled imports. With special permission of the Austrian health authorities, spot-checks on the luggage of passengers from 240 flights from non-EU countries arriving at the Vienna International Airport (VIE airport) were inspected over a period of eight months (August 2012 through March 2013). When POAO were detected, they were confiscated and subsequently analysed microbiologically for the prevalence of a range of foodborne bacterial pathogens, including *Salmonella* spp., *Campylobacter* spp., verotoxigenic *Escherichia coli*, coagulase-positive staphylococci (SA) and *Listeria monocytogenes*.

2. Material and methods

2.1. VIE airport: customs applicable flights

VIE airport acts as a new border to EU-third countries (non-EU members) and connects the EU closely with Northern Asia (Turkey, Russia), the Middle East (Arab countries) and the Far East (China). The airport includes a food and veterinary inspection service that covers non-EU and non-Schengen countries. In 2012 the total number of passengers (transfer, departure and arrival) passing through VIE airport was 22,165,794 and the total number of flights serviced was 244,650. More than 58,000 flights were categorized as customs applicable flights. Customs applicable flights are those flights conveying passengers from EU-third countries and flights from EU countries conveying transit passengers.

2.2. Checks by Austrian customs on traveller luggage for POAO

The EU has issued several directives and regulations concerning importation of foods and POAO: Commission Regulation No 206/2009 (EC, 2009a) states that all animal products originating from animals from third countries must be subjected to veterinary inspection. Among these products are those intended for personal consumption (potentially present in travellers’ luggage), those sent by post in small volumes to individuals and those sent as trade samples corresponding to 91/496/EC and 97/78/EC (EC, 1991, 1997). However, as comprehensive veterinary inspection is not possible, importation of a POAO is generally prohibited. As a result customs officers at VIE airport are obligated to perform spot-checks on arrival passengers. In contrast, air passengers within the EU are permitted to carry POAO for personal consumption.

These spot-checks are performed on the basis of individual risk analysis (type of luggage, origin and behaviour of travellers) and on the basis of ongoing animal disease reports and country risk assessments. On account of animal disease reports from the World Organization for Animal Health (OIE) and the Food and Agriculture Organisation of the United Nations (FAO), customs applicable flights are routinely categorized as either high or low risk flights. During the investigation period flights departing from Turkey, Egypt, China, the United Arab Emirates, Russia and countries of the former Soviet Union were classed as high risk flights. Customs officers were instructed to increase inspections of passengers from these high risk flights.

In the context of seizures customs officers retained information regarding the passenger flight data, flight number (data not shown), country of origin, airport of departure, whether or not there was a flight stop-over and the amount of sample material seized (total weight and number of pieces) for each POAO.

2.3. Austrian Ministry of Health exceptional approval of customs-seized POAO investigation

On the 14th of May, 2012 the University of Veterinary Medicine in Vienna (VUW) received essential authorization by the Austrian Ministry of Health, Department B/10 for Veterinary Law, Animal Health and Trade with Living Animals, to examine seized POAO present in the luggage of travellers from outside the EU for scientific purposes.

To comply with the authorization the following terms and conditions were established for the practical procedure at the border inspection point at VIE airport and the destination laboratory: (i) VUW, in cooperation with the Austrian Agency for Health and Food Safety (AGES), had to complete a detailed procedure statement about POAO sample collection and pickup at the VIE airport border inspection point. (ii) VUW was obliged to issue an accompanying document for each sample shipment, stating the following: Country of origin or flight number of the traveller from which the consignment was taken. This included the scientific name of the seized material, the animal species from which the material originated and a description to allocate the consignment to the document and the precise destination in Austria. (iii) Exact instructions in the accompanying document as to how to proceed in the event of incidents during transport to the delivery address, the name of the responsible contact person and how decontamination should be performed, including the substance to be used. (iv) Each movement was to be accompanied by an appropriate accompanying document. (v) Samples had to be transported in sealed impervious containers. Packaging had to comprise at least three layers: two layers had to be impermeable, pressure-resistant and shock-proof and the container had to be surrounded by absorbent material. (vi) Each container had to be marked in accordance with international regulations (UN 3373, UN 2814 or UN 2900). Containers or their external packaging had to be clearly marked “only for use in the laboratory” or “for laboratory use only.” (vii) Samples had to be sent from the border inspection post at VIE airport directly to the Austrian L3 High Security Laboratory. (viii) Sample materials had to undergo risk assessment at AGES, including all necessary investigations. (ix) Packaging and non-essential research material had to be incinerated in a disease-proof manner using an approved disposal system for clinical or laboratory waste, according to European Regulation No. 1069/2009 (EC, 2009b). (x) All required work had to be conducted in a manner to secure and exclude danger to Austrian livestock.

2.4. POAO sample collection and pickup at VIE airport border inspection post

Six different categories of POAO samples could be differentiated: (i) milk and all types of milk products, including milk powder and baby-food containing milk; (ii) eggs and egg products, including egg powders; (iii) honey; (iv) meat and meat products (v) fish and marine products and (vi) bush meat.

Bush meat is a specific designation for animal game hunted in the jungle or savannah, most usually in Africa. This particularly includes not only meat from duiker (small antelope), rats, apes and porcupines, but also meat from other mammals (such as elephants, buffalos), birds, reptiles and amphibians.

From all POAO confiscated by customs, 600 samples were selected for further study. The following selection criteria were implemented: samples had to have a minimum weight of 300 g. Raw, ready-to-eat, perishable and exotic POAO (e.g. bush meat) were given preference. All 600 samples selected for the study were classified into three categories: (i) ready to eat, (ii) raw products anticipated to require preparation, clearly not in edible form, and (iii) canned goods, sealed with tin-plate or aluminium.

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