

Foodborne antimicrobial resistance as a biological hazard

At the request of the European Commission, the Panel on Biological Hazards of the European Food Safety Authority (EFSA) published its scientific opinion with regard to the extent to which food serves as a source of antimicrobial-resistant (AMR) bacteria or bacteria-borne antimicrobial resistance genes. In addition EFSA ranked the identified risks and identified potential control options for reducing human exposure to AMR bacteria and/or genes. Following is a summary of the scientific report of EFSA.

Background

Antimicrobial resistant bacteria are associated with increased human morbidity and mortality and are of public health concern. The use of antimicrobial agents in animals and in plant production can result in the creation of a reservoir of resistant bacteria and resistance genes that can be passed on to humans. In addition the recently identified link between AMR and enhanced virulence in foodborne pathogens is also a cause for concern.

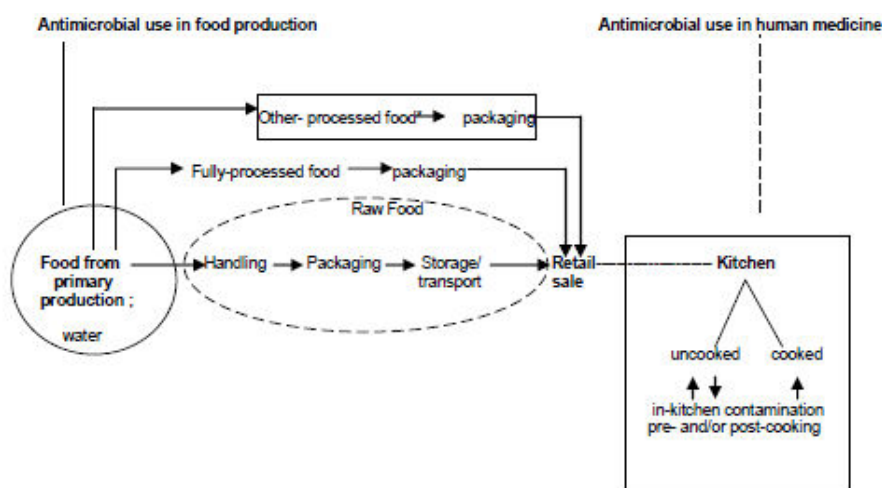
The use of antimicrobial agents for the treatment and control of infectious diseases in animals and crops cannot be discontinued because of considerations regarding animal health and welfare, and plant health. However, since January 2006 the addition to animal feed of antimicrobials at subclinical levels, for use as growth enhancers, has been banned within the EU in order to reduce the number of AMR in farm animals (Regulation (EC) No 1831/2003). The effect of this ban on the extent of bacterial antimicrobial resistance both within farm animals, and with regard to human health is unclear however.

Chief foodborne routes of contamination

Antimicrobial-resistant bacteria and bacteria-borne resistance genes can be spread to humans *via* food by different routes and mechanisms, for example:

- By foodborne spread of resistant zoonotic bacteria, e.g. *Salmonella* and *Campylobacter*. These bacteria may originate from various sources, including animals, the environment and humans.
- By foodborne spread of resistant non-zoonotic human pathogenic bacteria e.g. *Shigella* spp. and *Vibrio* spp. These bacteria can be transferred to food directly by infected humans or indirectly through the environment, including water.
- By foodborne spread of resistant commensal bacteria carrying transferable antimicrobial resistance genes that can be passed on to human pathogenic bacteria. These resistant commensal bacteria may originate from various sources, including animals, the environment and humans.

Figure 1. Possible routes of transmission of antimicrobial resistance *via* food



Relevant sources of antimicrobial resistant bacteria

Resistant *Salmonella* and *Campylobacter* involved in human disease are mostly spread via food. With regard to *Salmonella*, contaminated poultry meat, eggs, pork and beef are prominent vectors, whereas for *Campylobacter*, contaminated poultry meat is an important source. Cattle are a major reservoir for verotoxigenic *Escherichia coli* (VTEC) and resistant strains may colonize humans via contaminated meat of bovine origin or vegetables contaminated by dung. Animal-derived products can also be a potential source of meticillin-resistant *Staphylococcus aureus* (MRSA).

Food is also an important source for human infections with antimicrobial resistant *Shigella* spp. and *Vibrio* spp., although these are non-zoonotic pathogens. The public health consequences of exposure to antimicrobial-resistant commensal bacteria through food are still unclear.

A major source of human exposure to fluoroquinolone resistance is poultry, whereas for cephalosporin resistance poultry, pork and beef are important vectors.

Recommended control measures

The Biohazard Panel recommended the following control measures.

In terms of impact, controls operated at the pre-harvest phase, for example those aimed at the control and limitation of antimicrobial usage, are potentially the most effective and as such are capable of playing a major role in determining the AMR-status of food as presented for sale. Food production systems for cattle, pigs and poultry require special attention to prevent spread of resistance to fluoroquinolone and cephalosporin to other animal species and humans.

However all stakeholders should acknowledge their responsibilities for preventing both the development and spread of AMR, each in their own area of activity including medicine, veterinary medicine, primary food animal production, food processing and food preparation, as well as in the regulation of food safety.

Source:

http://www.efsa.europa.eu/EFSA/efsa_locale-1178620753812_1211902034881.htm