

zones. The widespread environmental contamination with ARB is also detected indoor mainly in urban areas, as have been shown in studies conducted on bus lines (Mendes et al. 2015) or with domestic animals that cohabit with their owners (Leite-Martins et al. 2014). In fact, from what is known nowadays, one can wonder which places are antibiotic-resistance-free. This contamination originates essentially from animals and humans. Whether a part of this contamination returns to humans is an issue yet to be clarified (Manaia 2017).

10.9 Antibiotic Resistance in Humans and Animals

Prophylaxis and metaphylaxis, i.e. the use of therapeutic or sub-therapeutic doses of antibiotics in healthy animals to prevent infectious diseases, to both healthy and infected animals are relevant contributions for the contaminant resistome. Although some antibiotics are restricted to the animal use (e.g. tylosin, apramycin, avoparcin), others are used in both food animals and the treatment of humans' infections (e.g. gentamicin, tetracyclines, penicillins, and sulfonamides) (Kemper 2008; Landers et al. 2012). In addition, although some antibiotics are restricted to veterinary use, they belong to the same general classes of those used in humans; thus, even if they are not the same exact compound, their mode of action is the same or similar (Phillips et al. 2004). The major fraction of antibiotic consumption is associated with animal production, not only because more individual doses are used but also because the therapeutic doses, which are proportional to the body weight, are higher for some animals than for humans. The influence of the antibiotic use on the enrichment of ARB in animals has been demonstrated. For example, in Denmark it was observed a reduction, from 80 to 3%, in the levels of vancomycin-resistant enterococci in poultry after the banning of avoparcin as growth promoter (Singer et al. 2003). Although the association of avoparcin, and other glycopeptides, with the prevalence of vancomycin resistance in livestock is one of the most studied, other associations have been demonstrated for other classes of antimicrobials, such as virginiamycin use and quinupristin/dalfopristin resistance; tylosin use and erythromycin resistance; avilamycin use and avilamycin resistance (Wegener 2003; Bengtsson and Wierup 2006; Cogliani et al. 2011). Some examples of co-selection were also documented, as the genetic linkage of the genes *vanA* and the macrolide resistance gene *ermB* in glycopeptide-resistant enterococci from porcine origin. Thus, the ban of avoparcin was not enough to decrease the prevalence of glycopeptide-resistant enterococci, as this decrease was observed only after the ban of macrolide growth promoters (Aarestrup 2000; Boerlin et al. 2001).

Recently the World Health Organization published a list of antibiotic-resistant "priority pathogens," including 12 groups of bacteria that pose the greatest threat to human health (WHO 2017). The most critical groups given their