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## ANTIBIOTICS AND ANTIMICROBIAL RESISTANCE: CAUSES AND POSSIBLE SOLUTIONS

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### INTRODUCTION

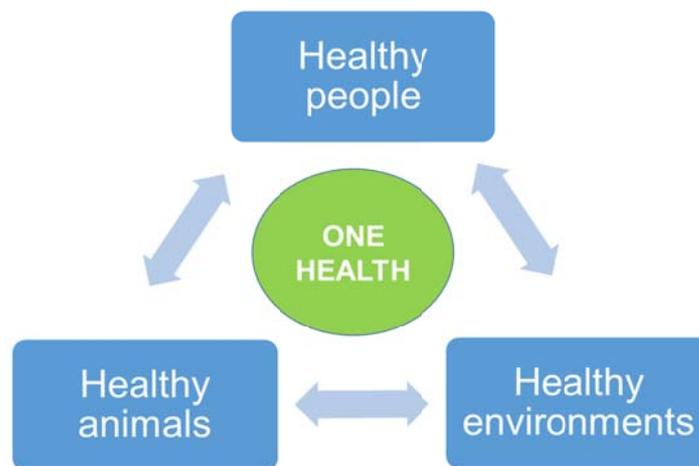
Antibiotics have been used in human and veterinary medicine for more than 60 years to ensure the health of both animals and humans. As a consequence of the selective pressure exerted by antibiotics on bacteria and the spread of difficult-to-treat multi-drug resistant pathogens observed during the last two decades, their use in human and veterinary medicine must be urgently controlled. Recent data estimates 25,000 human deaths per year in the EU and that illness treatment related with antimicrobial resistance (AMR) costs to the EU is 1.5 billion euro annually. In 2017 the Centres for Disease Control and Prevention (CDC) estimated that in the USA, 2 million persons per year become infected by bacteria resistant to antibiotics. Projections indicate that antimicrobial resistance (AMR) has the potential to become the primary economic and societal challenger worldwide. Even if resistance is a natural biological phenomenon, it is amplified by several interconnected factors as: (i) direct (generation of new AMR), due to inappropriate use of antibiotics or ineffective strategies to prevent their use; (ii) indirect (spread of AMR), due to global tourism, trade in food and animals and environmental spread of manure, slurry and other by-products.

Since 2001, the European Commission (EC) has paid increasing attention to AMR and developed a targeted strategy against the related threats it poses (Action Plan against the rising threats from AMR, 2011 and 2017) adopting the “One Health Approach” (Figure1). The available data show that averagely 70% of the sold antibiotics are used in food producing animals, and part of them are categorized as Highest Priority Critically Important Antimicrobials (HPCIA). Today, there is a worldwide consensus in the livestock sector regarding the aim of reducing the use of these drugs. Moreover, in the recent years, the livestock production experienced a dynamic condition in which several changes has been imposed or recommended, to enhance its social (consumer acceptance and human health), environmental (reduce pollution, spread of antibiotics and AMR) and economic (reducing production losses due to animal health problems) sustainability. These modifications can be ascribed to the synergy of two factors: **(i)** scientific progress; **(ii)** modification of the cultural perception for the livestock production. Even important progress has been done, the challenge for the livestock industry remain to meet an increasing global demand for protein of animal origin without threatening the medical care of humans and animals. However, the intensive production model, based on maximizing productivity and efficiency, often involves overuse and misuse of antibiotics to ensure animal health and product(ion) safety.

The ESVAC report shows a substantial variation in the prescribing patterns of various antimicrobials for food-producing animals. For instance, in 2014 the sales of veterinary antimicrobial agents for livestock in the European countries ranged from 3.1 (Norway) to 418.8 (Spain) mg active ingredient per population correction unit (PCU). However, the decline in the sales of antimicrobials for food-producing species in some countries indicates that there is also a potential for a decrease in other countries (EMA/61769/2016).

The responsible use of antimicrobials in veterinary medicine is one of the main EU policy areas relevant to tackling antimicrobial resistance. As reported in the recent document published from EU commission (2015/C299/04) on the prudent use of antimicrobials in veterinary medicine, the “appropriate use” approach needs to be twinned with preventive intervention based on a well-designed management strategies able to maintain/favor the pig health, by promoting the natural defenses development to increases the resistance against pathogen infections.

**Figure 1.** OneHelath apprach



## CONCLUSIONS

The new scenario for the livestock production, mainly due to the new perception of the consumers living in the western countries based on the more attention for the animal welfare and the environment safeguard, could be an opportunity to improve the farm management and concur in reducing the gap between EU countries for the animal welfare and antibiotics consumption. Several improvements can be made to favour the adaptation of the domesticated animals to the confined farming. Technological and housing improvements coupled with specific strategies to increase the adaptive capacity of the animals to the confined rearing systems can have unexpected impact on animal health and food safety.

## REFERENCES

- (1) EMA/61769/2016, Sales of veterinary antimicrobial agents in 29 European countries in 2014.
- (2) 2015/C 299/04. Commission Notice — Guidelines for the prudent use of antimicrobials in veterinary medicine.