EDITORIAL

Reducing Antimicrobial Usage in Agriculture and Aquaculture: Beyond Regulatory Policy

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Antimicrobial resistance in both pathogenic and commensal bacteria is increasing steadily. This increasing resistance can result in therapeutic failure in both humans and animals when infections have to be treated with antimicrobials. In human medicine, there are well-documented increases in morbidity, mortality and overall healthcare cost when infections are associated with resistant instead of susceptible bacteria. In veterinary medicine, there also are additional issues associated with animal welfare and increased economic costs for production.

The problem of increasing resistance is recognized at the global level by several international organizations with the so-called Tripartite comprising the World Health Organization (WHO), Food and Agriculture Organization of the United Nations (FAO) and the World Organisation for Animal Health (OIE) leading the discussions on critical needs for human and animal health, and on the relation between the usage of antimicrobials in animal production and the consequences for human health. At the national and regional regulatory and policy level, documents promoting prudent use of antimicrobials in both veterinary and human medicine have been published. These policy documents are available at both the global level and national levels and, in many cases, are coordinated with specific animal production groups.

The issue of antimicrobial usage in agriculture and aquaculture, and the attempts to regulate and affect policy changes therein are marked by several competing and conflicting paradoxes that can differ greatly around the world. Indeed, it can be argued that the combination of regulations (or, lack thereof) with differing voluntary or prudent use guidelines, for the various uses and classes of antimicrobials, might well exceed the range of complexities of antimicrobial resistance themselves. For example, in some jurisdictions (typically in the developed world), access to a limited array of antimicrobial classes is restricted to medical or veterinary prescription only and not for the purposes of promoting growth or feed efficiency. In other jurisdictions (typically in the developing world, but not always), there is easy access to all classes of antimicrobials with little or no veterinary or medical oversight.

Even within these broad sweeping classifications there exists a wide range of policies, both written and unwritten, that govern the actual use of these essential medicines. These factors that affect agriculture and aquaculture usage patterns range from the glaringly obvious (legislative restrictions and animal health economics) to the less obvious (social norms and a sense of moral duty and trust, which can help to explain varying usage patterns within any given set of regulations or economic conditions). Adding to the complexity are the various economies (monetary, political and moral) as well as the interests and concerns of a wide range of individuals and groups ranging from the pharmaceutical and agricultural production side, through to the consumer and healthcare advocacy sides. Setting boundaries on the limits of discussion by framing the issue either as a strictly scientific one or else as a strictly economic one will necessarily alienate and marginalize persons and groups with legitimate concerns and work against furtherance of the objectives of reducing overall usage, promoting responsible and prudent use of antimicrobials and decreasing risks to human and animal health.

There are successful examples of countries and regions where a reduction of antimicrobial usage in veterinary medicine and animal agriculture and aquaculture has been achieved. In the European Union the use of growth promoters (the use of subtherapeutic level of antimicrobials in animal feed to increase the growth rate and feed efficiency of animals) has been banned since 2006. At the national level, Denmark is the clearest example where over a period of 18 years a more prudent use (restricted usage in volume and certain classes of antimicrobials) has been successively and successfully introduced in veterinary medicine. In the Netherlands, a reduction of 50% of veterinary usage has been achieved over the last 5 years. However, the number of countries where a successful intervention has been introduced is very limited. Worldwide, there is still an overwhelming and unrestricted use of antimicrobials in animal production. Additionally, there is a worldwide overuse in human medicine with over-the-counter availability of antimicrobials. Understanding the barriers and opportunities for change in antimicrobial use that exist worldwide, and the unique aspects that can lead to improvements in antimicrobial use in different countries around the world was the primary objective of a meeting held in Utrecht, the Netherlands, from 1 to 3 July 2013. Sponsored by the Organisation for Economic Cooperation

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This special issue of *Zoonoses and Public Health* highlights papers from a number of authors from around the world. Central to the theme of the meeting, the emphasis of these papers is on measuring antimicrobial use, resistance and identifying specific and more general ways to influence and promote judicious use of these products. A companion website has been created to likewise spotlight efforts from around the world to communicate, improve the antimicrobial supply chain and emphasize country-level programs, especially in the less developed world. Participants in the meeting came from five continents and represented government, academia, industry and other stakeholder groups. A unifying theme was a genuine interest and desire in identifying both the common and unique features of different jurisdictions and settings that provide opportunity for effective systemic intervention. Papers featured in this special issue are peer-reviewed examples of approaches that have worked in specific settings, or can more generally be applied as a template for action anywhere in the world.

Conflict of Interest

The authors have no conflicts of interest to declare.

