

Chapter 63

The Future of Antibiotics and Meat

Talia Raphaely

Curtin University, Australia

Dora Marinova

Curtin University, Australia

Mira Marinova

Notre Dame University, Australia

ABSTRACT

This chapter discusses antibiotic use in the livestock industry and potential ramifications for human health. Antibiotics are routinely administered to food animals, primarily at sub-therapeutic levels. The extensive use of antibiotics in global animal husbandry in quantities greater than used for humans is creating antibiotic resistance. There is evidence that antibiotic resistant organisms emerging in food animals transfer to humans through the food chain, environmental contamination, direct association with animals or through mobile resistant genetic elements resulting in co-resistance to other antibiotics. No new classes of antibiotics have been developed since the 1980s. Intensifying use of existing antibiotics for meat production poses new challenges for treating humans, needs to be taken seriously and dealt with urgently. This chapter argues that reduced meat consumption is an under-considered but essential part in any suite of solutions aimed at preserving the use of antibiotics for human treatment.

INTRODUCTION

Demand for animal protein for human consumption is escalating worldwide at a record pace. To meet this challenge, intensification of production has occurred. Contemporary intensive animal production processes are associated with systematic, therapeutic and non-therapeutic use of antibiotics to control infectious diseases or to promote efficient production. Antibiotic use in meat production is likely to pose new challenges for treating human illness and infections. There is an increasingly likely possibility of

DOI: 10.4018/978-1-5225-1674-3.ch063

a post-antibiotic world where bacterial infections, now largely treatable, become the life-threatening scourges they once were. Antibacterial resistance is becoming a “ticking time bomb in our midst, which needs to be taken seriously and urgently dealt with (HAIAP & TWN, 2013, p. 2).

This chapter describes the potential impending international crisis of antimicrobial resistance in relation to increasing meat consumption. It argues for the urgent need to take action through reducing both, meat consumption and antibiotic use.

ANTIBIOTIC USE

Before we engage with the threats posed by the wide application of antibiotics, it is useful to define some of the terms used in this chapter. This is followed by a brief history of the antibiotic era.

Terminology

For the layperson, the terminology around the use of antibiotics may be unclear. Antibiotics are defined as substances, which can kill or inhibit the growth of bacteria and can be produced by microorganisms or synthetically (but still chemically related to natural versions). Antimicrobials include antibiotics as well as other substances (such as fungicides and disinfectants) that kill or inhibit the growth of microorganisms. In the medical literature the two terms are used interchangeably.

Antibiotic or antimicrobial resistance is when the targeted bacteria are no longer controlled or killed by the presence of antibiotics but are able to survive and even multiply. In the literature antibacterial or antibiotic resistance (ABR) and antimicrobial resistance (AMR) are also used synonymously. In this chapter we refer only to antibiotics and thus use the acronym ABR.

A Brief History of the Antibiotic Era

Antibiotics made a significant contribution to the control of infectious and bacterial diseases that for much of humanity's existence were the leading causes of human mortality and morbidity. Although it is common belief that exposure to these substances has been confined to the modern antibiotic era, research reveals antibiotics have been in use since antiquity. Traces of tetracycline found in Sudanese human skeletal remains (from 350-550 CE) point to tetracycline-containing materials in the diets of these ancient peoples (Bassett, Keith, Armelagos, Martin & Villanueva, 1980; Nelson, Dinardo, Hochberg & Armelagos, 2010). Although it is not clear whether these were used specifically for disease control, histological samples taken from late Roman period skeletal remains from the Dakhleh Oasis in Egypt also evidence the presence of tetracycline in the diet at that time (Cook, Molto & Anderson, 1989). Interestingly, rates of bacterial infection documented in these two population groups were low (Armelagos, 1969; Cook et al., 1989). Anecdotes about red soils in Jordan historically used for their antibiotic-like properties in treating skin infections have led to discovering antibiotic-producing bacteria and concomitant antibiotic production in these soils. Traditional Chinese medicine used remedies for millennia based on plants containing powerful antimicrobial substances (Cui & Su, 2009) also offering evidence of human exposure in the pre-antibiotic era.

The modern “antibiotic era” is associated first with Paul Ehrlich and then with Alexander Fleming. Ehrlich in 1904 envisaged a magic bullet that selectively targeted only disease-causing microbes

21 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

www.igi-global.com/chapter/the-future-of-antibiotics-and-meat/165870

Related Content

Community-Driven Health-Impact Assessment: A Promising PATH for Promoting Community Learning and Social Responsibility for Health

Maureen Coady (2014). *Handbook of Research on Adult and Community Health Education: Tools, Trends, and Methodologies* (pp. 17-34).

www.irma-international.org/chapter/community-driven-health-impact-assessment/113611

Exploring the Need for More Women in Leadership Roles in Public Health and Emergency Response Logistics

Darrell Norman Burrell, Orna T. Bradley-Swanson, Jorja B. Wright, Tiffany Shockley, Kim L. Brown-Jackson, Eugene J. M. Lewis, Terrence Duncan and Judith Mairs-Levy (2021). *International Journal of Applied Research on Public Health Management* (pp. 29-48).

www.irma-international.org/article/exploring-the-need-for-more-women-in-leadership-roles-in-public-health-and-emergency-response-logistics/278789

A Non Invasive Heart Rate Measurement System for Multiple People in the Presence of Motion and Varying Illumination

Humaira Nisar, Muhammad Burhan Khan, Wong Ting Yi, Yeap Kim Ho and Lai Koon Chun (2016). *International Journal of Disease Control and Containment for Sustainability* (pp. 1-11).

www.irma-international.org/article/a-non-invasive-heart-rate-measurement-system-for-multiple-people-in-the-presence-of-motion-and-varying-illumination/170382

Blockchain Applications in the COVID-19 Era

Zeki Özen (2022). *Handbook of Research on Interdisciplinary Perspectives on the Threats and Impacts of Pandemics* (pp. 305-319).

www.irma-international.org/chapter/blockchain-applications-in-the-covid-19-era/291925

Study of the Structure and Properties of Nanoparticles *Cynara scolymus* L. Encapsulated With Sodium Carboxymethyl Cellulose Polysaccharide

Muborak A. Tulyasheva, Sobitjan Y. Inagamov and Gafur I. Mukhamedov (2021). *International Journal of Applied Nanotechnology Research* (pp. 1-10).

www.irma-international.org/article/study-of-the-structure-and-properties-of-nanoparticles-cynara-scolymus-l-encapsulated-with-sodium-carboxymethyl-cellulose-polysaccharide/287586