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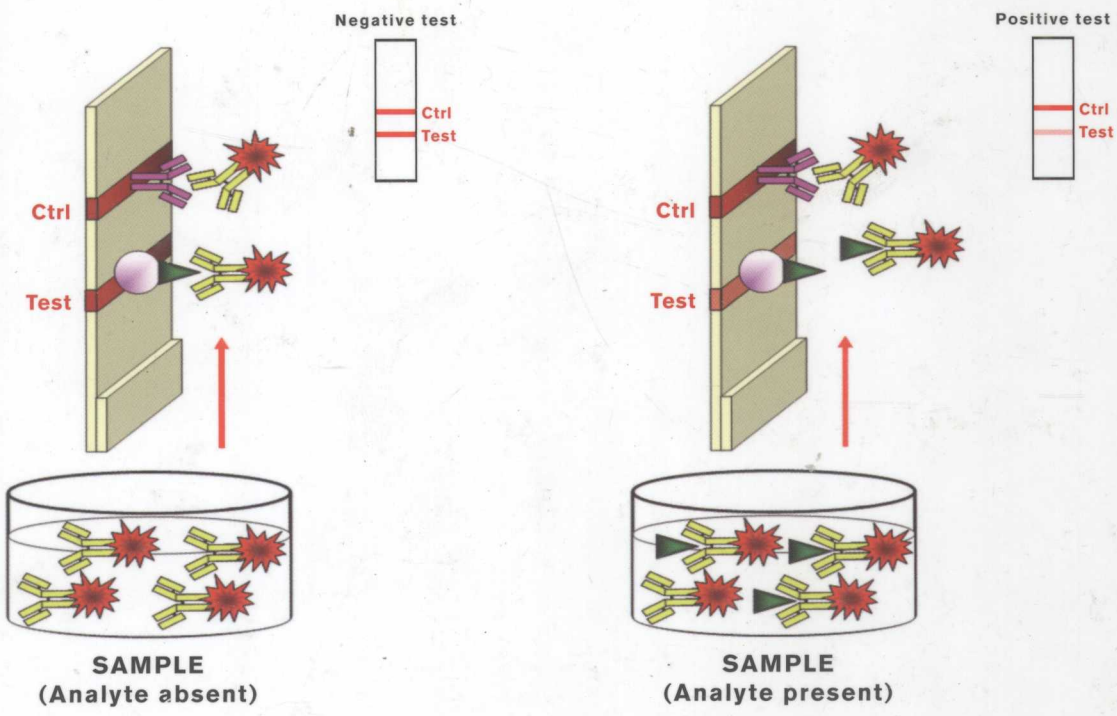
Chemical Analysis of Antibiotic Residues in Food

Edited by
Jian Wang, James D. MacNeil, *and* Jack F. Kay



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Edited by

JIAN WANG
JAMES D. MacNEIL
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PREFACE

Food safety is of great importance to consumers. To ensure the safety of the food supply and to facilitate international trade, government agencies and international bodies establish standards, guidelines, and regulations that food producers and trade partners need to meet, respect, and follow. A primary goal of national and international regulatory frameworks for the use of veterinary drugs, including antimicrobials, in food-producing animals is to ensure that authorized products are used in a manner that will not lead to non-compliance residues. However, analytical methods are required to rapidly and accurately detect, quantify, and confirm antibiotic residues in food to verify that regulatory standards have been met and to remove foods that do not comply with these standards from the marketplace.

The current developments in analytical methods for antibiotic residues include the use of portable rapid tests for on-site use or rapid screening methods, and mass spectrometric (MS)-based techniques for laboratory use. This book, *Chemical Analysis of Antibiotic Residues in Food*, combines disciplines that include regulatory standards setting, pharmacokinetics, advanced MS technologies, regulatory analysis, and laboratory quality management. It includes recent developments in antibiotic residue analysis, together with information to provide readers with a clear understanding of both the regulatory environment and the underlying science for regulations. Other topics include the choice of marker residues and target animal tissues for regulatory analysis, general guidance for method development and method validation, estimation of measurement uncertainty, and laboratory quality assurance and quality control. Furthermore, it also includes information on the developing area of environmental issues related to veterinary use of antimicrobials. For the bench analyst, it provides not only information on sources of methods of analysis but also an understanding of which methods are most suitable for addressing the regulatory requirements and the basis for those requirements.

The main themes in this book include antibiotic chemical properties (Chapter 1), pharmacokinetics, metabolism, and distribution (Chapter 2); food safety regulations (Chapter 3); sample preparation (Chapter 4); screening methods (Chapter 5); chemical analysis focused mainly on LC-MS (Chapters 6 and 7), method development and validation (Chapter 8), measurement uncertainty (Chapter 9), and quality assurance and quality control (Chapter 10).

The editors and authors of this book are internationally recognized experts and leading scientists with extensive firsthand experience in preparing food safety regulations and in the chemical analysis of antibiotic residues in food. This book represents the cutting-edge state of the science in this area. It has been deliberately written and organized with a balance between practical use and theory to provide readers or analytical laboratory staff with a reference book for the analysis of antibiotic residues in food.

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EDITORS

Dr. Jian Wang received his PhD at the University of Alberta in Canada in 2000, and then worked as a Post Doctoral Fellow at the Agriculture and Agri-Food Canada in 2001. He has been working as a leading Research Scientist at the Calgary Laboratory with the Canadian Food Inspection Agency since 2002. His scientific focus is on the method development using liquid chromatography-tandem mass spectrometry (LC-MS/MS) and UPLC/QqTOF for analyses of chemical contaminant residues, including antibiotics, pesticides, melamine, and cyanuric acid in various foods. He also develops statistical approaches to estimating the measurement uncertainty based on method validation and quality control data using the SAS program.

Dr. James D. MacNeil received his PhD from Dalhousie University, Halifax, NS, Canada in 1972 and worked as a government scientist until his retirement in 2007. During 1982–2007 he was Head, Centre for Veterinary Drug Residues, now part of the Canadian Food Inspection Agency. Dr. MacNeil has served as a member of the Joint FAO/WHO Expert Committee on Food Additives (JECFA), cochair of the working group on methods of Analysis and Sampling, Codex Committee on Veterinary Drugs in Foods (CCRVDF), is the former scientific editor for "Drugs, Cosmetics & Forensics" of J.AOAC Int., worked on IUPAC projects, has participated in various consultations on method validation and is the author of numerous publications on veterinary drug residue analysis. He is a former General Referee for methods for veterinary drug residues for AOAC International and was appointed scientist emeritus by CFIA in 2008. Dr. MacNeil holds an appointment as an adjunct professor in the Department of Chemistry, St. Mary's University.

Dr. Jack F. Kay received his PhD from the University of Strathclyde, Glasgow, Scotland in 1980 and has been involved with veterinary drug residue analyses since 1991. He works for the UK Veterinary Medicines Directorate to provide scientific advice on residue monitoring programmes and manages the research and development (R&D) program. Dr. Kay helped draft Commission Decision 2002/657/EC and is an International Standardization Organization (ISO)-trained assessor for audits to ISO 17025. He served as cochair of the CCRVDF ad hoc Working Group on Methods of Sampling and Analysis and steered Codex Guideline CAC/GL 71–2009 to completion after Dr. MacNeil retired. Dr. Kay now cochairs work to extend this to cover multi-residue method performance criteria. He assisted JECFA in preparing an initial consideration of setting MRLs in honey, and is now developing this further for the CCRVDF. He also holds an Honorary Senior Research Fellowship at the Department of Mathematics and Statistics at the University of Strathclyde.

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