Preface of Veterinary Pharmaceuticals in the Environment

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Abstract
An important symposium was presented on "Veterinary Pharmaceuticals in the Environment" at the 233rd National Meeting of the American Chemical Society on March 25-26, 2007, in Chicago, IL. The excellence and timeliness of the presentations indicated the need for an ACS Symposium Series book addressing the environmental chemistry and toxicology of this group of emerging contaminants.

The purpose of this symposium was to bring together scientists from academia, government, and industry to discuss and present data relevant to the significance of veterinary pharmaceuticals in the environment. A broad range of topics was covered, including environmental chemistry studies focusing on transport, mobility, sorption, persistence, and bioavailability of the compounds, as well as development of analytical techniques relevant to detection of the pharmaceuticals in environmental matrices, discussion of ecotoxicological studies of veterinary pharmaceuticals, and information relevant to ecological risk assessments. The primary classes of drugs addressed herein are veterinary antibiotics and synthetic

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Chapter 1

PREFACE

Veterinary Pharmaceuticals in the Environment

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The purpose of this symposium was to bring together scientists from academia, government, and industry to discuss and present data relevant to the significance of veterinary pharmaceuticals in the environment. A broad range of topics was covered, including environmental chemistry studies focusing on transport, mobility, sorption, persistence, and bioavailability of the compounds, as well as development of analytical techniques relevant to detection of the pharmaceuticals in environmental matrices, discussion of ecotoxicological studies of veterinary pharmaceuticals, and information relevant to ecological risk assessments. The primary classes of drugs addressed herein are veterinary antibiotics and synthetic hormones. The antibiotics include some that are also used in human medicine and others that are unique to animal medicine. A number of the most widely used antibiotics are employed two different ways: therapeutically to cure or prevent diseases, or as growth promoters. Synthetic hormones are utilized to influence the development of animals, in particular in regards to weight gain and body composition. Many of the environmental concerns over veterinary pharmaceuticals arose from runoff and wastes from confined animal feeding operations (CAFOs), where tens of thousands of meat animals are confined in a small area. In such situations, the drugs that are excreted intact or partially metabolized can still be biologically active when they enter the environment; even natural hormones from the animals constitute a significant portion of the overall input of bioactive chemicals.

To date, there have been numerous monitoring studies that have confirmed the existence of very low concentrations of animal pharmaceuticals and hormones, especially in surface waters. The next important question is whether those
residues are of any significance in the environment, including questions about how long they persist, what analytical methods should be used to quantify them, where they come from, how they move, whether they accumulate in environmental sinks, what kinds of biological effects they have, the species affected, and possible prevention or mitigation strategies. One of the most prominent controversies is the one generated around the possibility of antibiotics inducing or sustaining antibiotic-resistant microorganisms in the environment. Another focus is on the hormonal effects on fish and wildlife, especially as the hormones (synthetic or natural) influence reproduction and sexual development in wild mammals, birds, fish, and amphibians.

We believe that this book addresses some pressing scientific questions, including the monitoring of the drugs in the environment, the development of analytical chemical and immunochemical methods of quantifying low levels of the residues, their mobility, biological availability, uptake, effects on organisms, as well as perspectives on ecological risk assessment of these types of chemicals.

Acknowledgments

We appreciate the time and effort that the authors contributed toward this book. We thank the ACS Division of Agrochemicals for providing financial assistance and the venue for the symposium on which this book is based. John J. Johnson’s assistance was also invaluable, as Program Chair of the AGRO Division. We are grateful to all of the peer reviewers of the chapters for their expertise and their effort, and we appreciate the support and assistance from Bob Hauserman, Jessica Rucker, and ACS Books which culminated in the publishing of this volume. Keri Henderson dedicates this book to her daughter Reese, and Joel Coats dedicates it to his grandchildren, Leola, Chloe, Katherine, Ivy, and Grace.