

WILLIAMS, R. E. 2010. *Veterinary Entomology: Livestock and Companion Animals*. CRC Press, Taylor and Francis Group, Boca Raton, FL, USA, xxvii + 343 pp. Hardback, ISBN 978-1-4200-6849-8, \$99.95.

The protection of livestock and companion animals from pestiferous arthropods is of utmost concern to commercial agriculture, hobby farmers, veterinarians and pet owners. *Veterinary Entomology: Livestock and Companion Animals* is a concisely written and well-organized book that many readers will find extremely useful. This book has its origin in an earlier publication, with considerable updating and expansion into the companion animal area. Although this text will find its most use in college classrooms for teaching undergraduate veterinary or livestock entomology courses, it will be a valuable reference for anyone who regularly deals with these injurious pests in an extension capacity.

The book is organized into 15 chapters that include 2 introductory chapters: Importance of Arthropods, Principles of Arthropod Management, followed by 7 chapters demarking the primary groups of pests (Diptera, Myiasis-causing Diptera, Lice, Fleas, Mites, Ticks and Other Arthropod Groups of Veterinary Importance). Following the description of the individual pest players, the book takes the reader through the often-specialized pest management steps used in the agricultural and companion animal groups. These chapters use the following structure: Cattle, Swine, Sheep and Goat, Poultry, Equine and Pet. A selection of references and an index complete the book.

Chapter 1 provides a brief, but well summarized, overview of the types of parasitism, damage caused to animals by arthropods, and the use of economic injury levels. In Chapter 2, the reader is introduced to the unique methods of pest surveillance, types of pest management and an overview of the insecticides and application techniques used in veterinary entomology. This is particularly important as many products that can be used on other agricultural crops cannot be used on animals and many application techniques are specialized for animals (ear tags, pour-ons, and boluses).

To many of the non-entomologist readers, the array of insects found on livestock and pets is often overwhelming; requiring about two-thirds of this book to present. Additionally, this book predominantly covers the pests of the US and Canada, and as such, not all pests are present in all areas of these countries. Chapters 3, 4, 5, 6, 7, 8, and 9 present both the pests and their biological control agents to the reader in a repetitive format, first by introducing the geographic range, the importance, hosts or habitat, description and finally their biology/behavior. In following this approach, the reader can readily find the information that they require and easily move from the pest management chapters at the end of the book

back into the arthropod-description chapter of interest. Each chapter is fronted by an overall description of the arthropod order (or sub-set, in the case of Chapter 4, Myiasis) followed by a very useful table outlining the taxonomic relationships of the specimens to be discussed. The distinction of pest status is often in the perception of the person being attacked or annoyed, or in the particular behavior or presence of a fly at a given time or place. Such perceptions are recognized and addressed throughout these chapters.

Chapters 3 and 4 cover the Diptera. Within Chapter 3, the material is divided into the biting and the non-biting flies. Although this presentation has little to do with their taxonomic placement, it does serve as an important structure for the reader to follow. Some of these flies are considered the most important arthropod pests of respective veterinary animals, and as such, their placement and detailed description is appropriate. In Chapter 4 the flies that cause myiasis (infestation of living vertebrates by dipteran larvae) is addressed. The flies discussed herein are some of the most fascinating and bizarre found in the animal kingdom. Students and the general public invariably are both intrigued and repulsed by these highly evolved parasites. The material in this chapter is introduced by providing a classification of the types of myiasis (dermal, gastrointestinal, etc. and obligatory/facultative/accidental). Within this chapter, images of the adult and immature flies as well as images of the parasitism sites on animals are presented. Here, in particular, color images would have made these images much more useful.

Each of the pest management chapters (10, 11, 12, 13, 14 and 15) follows a standard design, making locating information easy. Besides the geographic location, the livestock management system employed by the farmer or rancher will dictate which pests are likely to be problematic. As such, each system will in some respect, create their own problems, requiring specialized solutions. With respect to the filth flies that commonly plague cattle, swine, poultry and horses, the first step in successful pest management is to recognize the livestock management system used: type of confinement or pasture (cattle and horses). Because filth flies are among the most important pests of livestock, they have received considerable attention from research and extension professionals resulting in diverse pest management options. Therefore, the portions of chapters dealing with filth fly management are presented in greatest detail and are appropriate for much of the US and Canada. In each pest management program described, the following categories are used or sum-

marized: surveillance, cultural/mechanical control, biological control and chemical control. For several of the other pests, the control options are much less diverse and therefore, their control section is condensed.

Chapters 14 and 15 deal with equine and pet pest management. These topics are not generally found in similar books and it is refreshing to see them addressed here. In particular, the information provided on flea management is of particular interest as veterinarians took over much of the flea control market in the 1990s when topical applications were made available. However, we may be seeing a return to a truly integrated program as fleas continue to develop insecticide resistance to these materials.

The book contains over 200 illustrations, including a four-page color plate. Many of the illustrations are exceedingly helpful; however, the book would have been aided greatly by the addition of more color images. The use of line drawings is of particular note, especially for some of the mite species from which it is notoriously difficult to obtain quality images. Beyond simply including images of the arthropods, the book contains many line drawings of life cycles that help to illustrate the importance of the use of pest biology when planning control tactics. Furthermore, the use of images of environmental conditions, ani-

mal management practices and pest management tactics greatly aids in the readers understanding of these often unique monitoring and control tactics.

Although this book provides an excellent overview of the arthropods to be expected in these commodities, the relationship of these pests to the disease-causing pathogens that many are vectors of is not strong. Many of the potential pathogens are touched upon, but some very important opportunities were missed, particularly in relation to the mosquito- and tick-borne pathogens. A chapter on the relationship of these vectors and their associated pathogens should be considered in a subsequent edition. Additionally, although this book presents a very good overview of the principles of pest management, the techniques will continue to evolve. The inclusion of information on where to locate additional information would be helpful (such as University Cooperative Extension programs or eXtension), perhaps at the end of each management chapter or at the end of the introductory chapter, with an inclusion in the index.

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